AMERICAN GAS ASSOCIATION MONTHLY

DECEMBER · 1935

"Mystery Chef" Gas Radio Program

C. W. PERSON

•

Building the Natural Gas Load

FRANK C. SMITH

•

Administration of Resuscitation

CECIL K. DRINKER, M.D.

•

Long Term Appliance Financing

M. E. SKINNER

THREE 1936 Sales Contests!

THE REFRIGERATION COMMITTEE will again hold its annual sales contest during the full three months' period of April, May and June. Profiting from experience gained in previous contests, the 1936 activity will be bigger and better than any previously held.

THE RANGE COMMITTEE will hold its contest during the six months of February 1 to July 31. Each registered company will select two months (not necessarily consecutive) of this period for an intensive campaign on modern gas ranges, and company prizes will be awarded for the best two months' showings and, also, for the best showings made during the entire six months' period.

THE WATER HEATING COMMITTEE will hold its first national sales contest during the eight months' period beginning February 1 and ending September 30. Each registered company will select two months (not necessarily consecutive) of this period for intensive promotion of automatic water heater sales, and company prizes will be awarded for the best showings during the two months' period and also for the entire eight months' period.

A comprehensive series of monthly prizes is being arranged for the ranking individual salesman in each of these contests and for those salesmen making the best showings during the entire contest.

The bulk of the cash awards in each contest will go directly to these men on the firing line. Each activity is designed to stimulate the sales of cooperating dealers.

For information, address Secretary, Commercial Section, A.G.A. Headquarters

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1935 Natural Gas Department Proceedings

Contains papers, reports, addresses and discussions presented at the annual meeting held in Memphis, Tenn., May 6-9, 1935.

272 pages, cloth bound and illustrated
Selling price—$2.00 to members
$4.00 to non-members

ADDRESS: AMERICAN GAS ASSOCIATION, 420 Lexington Ave., New York City

AMERICAN GAS ASSOCIATION MONTHLY

Contents for December 1935

VOLUME XVII NUMBER 12

New Gas Radio Advertising Program Features "Mystery Chef"..... 435
C. W. PERSON

Building the Natural Gas Load..... 440
FRANK C. SMITH

How To Use the Breathing Spell..... 442
F. S. WADE

Twelve Years' Experience in the Effective Administration of Resuscitation..... 444
CECIL K. DRINKER, M.D.

Gas Sales as Affected by Temperatures, Part 2 449
H. P. SMITH AND S. J. HELFMAN

Vigorous Discussion Marks Wisconsin Technical Meeting..... 452

McCarter Medals Awarded for Life Saving.... 454

Monograph 6 Reports on Flow of Natural Gas through High-Pressure Lines..... 457

Lone Star Company Tries Innovation in Laying New Line..... 458
E. F. SCHMIDT

The Use of Work Units in Assigning Meter Reading 460
HAROLD S. RAND

Long Term Financing of Appliances..... 462
MERRILL E. SKINNER

New Methods in Poultry and Egg Cookery.... 465
CLARA G. SNYDER

The Application of Gas-Fired Radiant Tubes to Porcelain Enameling..... 466
EDWARD J. GEHRIG

Observations on Soil Corrosion Mitigation in the Gas Industry..... 469
SCOTT EWING

Convention Calendar..... 471

Personnel Service..... 476

Published monthly by the American Gas Association. Publication Office, American Building, Brattleboro, Vt. Editorial Offices, 420 Lexington Avenue, New York, N. Y. Address all communications to 420 Lexington Avenue, New York, N. Y. The Association does not hold itself responsible for statements and opinions contained in papers and discussions appearing herein. Entered as Second Class Matter at the Post Office at Brattleboro, Vermont, February 10th, 1922, under the Act of March 3, 1879.

SUBSCRIPTION RATE : $3.00 A YEAR

"You, too, can be an artist at the gas range"

AMERICAN GAS
ASSOCIATION
MONTHLY

James M. Beall, Editor

New Gas Radio Advertising Program Features "Mystery Chef"

By C. W. PERSON
American Gas Association

THE largest cooperative advertising project launched to date in behalf of the gas business will get under way December 3 and 4 in the territory extending from Washington, D. C., to Portland, Maine, and from New York City to Buffalo, New York. The medium to be used is radio—two fifteen-minute morning periods a week for 52 weeks, or a total of 104 broadcasts. The sole talent to be featured is The Mystery Chef, popular radio personality whose cooking talks and recipes are known nationally. The object of the program is to create a strong consumer preference for gas fuel for cooking, refrigeration, water heating and house heating, with emphasis on cooking.

Participating in the venture are 87 gas and gas and electric companies which have 5,247,000 domestic meters in service out of a total of 6,000,000 domestic meters in the territory to be reached. When the program was in an early stage of development it was decided that unless companies having 4,500,000 domestic meters in use should support it no further action would be taken. Present commitments show this quota to be exceeded by 747,000 meters, which tells its own story of the strong interest manifested in the program and the desire of companies, large and small, to participate in a common endeavor.

Thirteen radio stations of the National Broadcasting Company are in the hook-up, as follows: WEAF, New York; WEEI, Boston; WTIC, Hartford; WJAR, Providence; WTAG, Worcester; WCSH, Portland; KYW, Philadelphia; WFBR, Baltimore; WRC, Washington; WGY, Schenectady; WBEN, Buffalo; WHAM, Rochester and WSYR, Syracuse. The two last named stations will use electrical transcriptions while all others will be served direct by "live" broadcast from the New York studios of NBC. The program will be broadcast on Tuesdays and Thursdays from Rochester and Syracuse stations, 9:45 to 10:00 A.M. by Rochester and 8:45 to 9:00 A.M. by Syracuse. On remaining stations the program will be broadcast on Wednesdays and Fridays from 10:30 to 10:45 A.M.

Stations that will broadcast the program

Stations to be used cover the eastern half of Pennsylvania, the District of Columbia and part of West Virginia, New York, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, and Rhode Island. In this area are 6,826,000 homes with radio sets.

The Mystery Chef is a Scot in the early fifties, who started from scratch about five years ago building up a radio listener interest in home cooking. His belief that anyone equipped with "fool-proof" recipes can easily master the art of food preparation quickly won for him a large and enthusiastic audience. After broadcasting for four years for a baking powder concern, three million copies of his recipe book had been distributed and he had received letters from one out of every four families in the United States.

In addition to being an expert cook in his own behalf and an ardent enthusiast for gas fuel, The Mystery Chef preaches an optimistic philosophy that injects sufficient "uplift" in his talks to give them a refreshing note that creates sustained interest. Combined with this is a radio personality and voice that carries sincerity.

Radio scripts and the 100-page recipe book to be featured on the program will be prepared by The Mystery Chef. The title of the latter is "Be An Artist At the Gas Range" and copies will be offered free by participating companies to those who request them. Cost of the program is 2½ cents per domestic meter per year

to cover time and talent expenses and four cents a copy for the recipe book.

The suggestion that gas companies in the Eastern section of the country sponsor a series of broadcasts by The Mystery Chef was first mentioned at a meeting of the Association's Publicity and Advertising Committee on June 19. The committee was sufficiently impressed with the possibilities of the project to solicit the support of companies, with the understanding that favorable commitments had to be received from companies serving 75% of the meters in the territory to assure the success of the undertaking. During July, August and September meetings of company representatives were held in New York, Boston, Philadelphia, Brooklyn and Buffalo. The response was so favorable that by the end of September it was a foregone conclusion that the program, barring any unforeseen developments, would become an actuality.

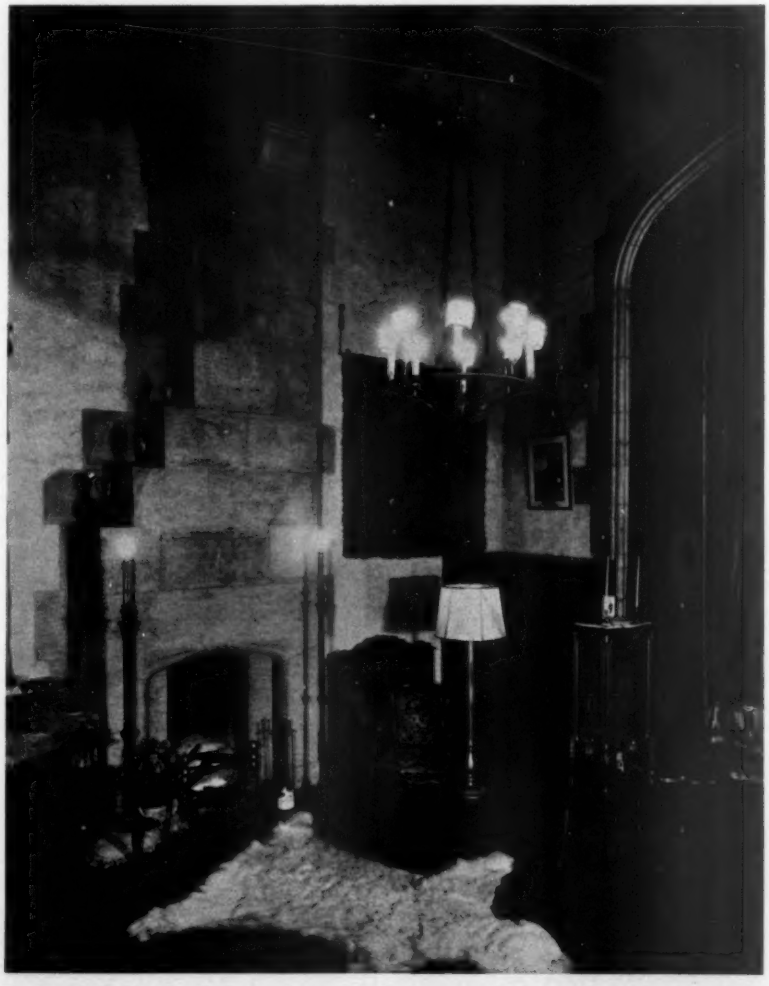
Directors Elected

The next step was to elect by ballot members of a directing committee to proceed with the preparation of detailed plans for the program. The following were elected by all companies then informally committed to support the program: N. T. Sellman, director of sales and utilization, Consolidated Gas Company of New York; E. J. Boothby, vice-president and general manager, Washington Gas Light Company; F. D. Cadwallader, vice-president, Boston Consolidated Gas Company; H. H. Cuthrell, manager, new business department, The Brooklyn Union Gas Company; R. A. Malony, sales manager, The Bridgeport Gas Light Company; H. D. Polhemus, vice-president, Jersey Central Power & Light Company; J. A. Weiser, vice-president and general manager, The Newport Gas Light Company, and J. H. Wells, superintendent, Hornell Gas Light Company.

At the first meeting of this committee, October 8, it was unanimously determined that a corporation should be formed under the laws of the State of New York, entirely independent of the American Gas Association, to supersede the committee in its contemplated work and to assume full charge of the proposed radio program. It was further agreed that all of the members of the directing committee, consisting of the above named individuals, should constitute the directors of the corporation. On October 17 a corporation was duly formed under the name of Regional Advertisers, Inc. The first meeting of directors was held on October 22 and the following officers were elected: N. T. Sellman, president; H. H. Cuthrell, treasurer, and Charles W. Person, secretary.

The directors appointed McCann-Erickson, Inc. of New York as advertising counsel. The firm of Cullen and Dykman, counsel for The Brooklyn Union Gas Company, had been previously selected to handle legal matters for the corporation. Contracts have now been signed between the corporation and the advertising agency, and at the time this is written a sufficient number of participating companies are under contract with Regional Advertisers, Inc., to guarantee the launching of the program on its scheduled dates of December 3 and 4. The corporation has full charge of the program in all of its details, including the sale of electrical transcriptions to gas companies outside of the present territory, and any network extension of the program to accommodate companies which may wish to participate. An Editorial Committee will supervise the scripts to be prepared by The Mystery Chef and will be advisory to the Board of Directors or its executive committee.

The corporation does not intend to



Portion of the Mystery Chef's penthouse. The kitchen is in the far corner, hidden by a screen of panelled wood

The kitchen revealed. A combination gas range and refrigerator unit is shown

make any profit out of the venture, and at its termination there will be refunded to each company participating in the project its proportionate share of any excess funds remaining after all expenses of the corporation have been paid.

The recipe book is now in course of preparation and will contain some general matter on gas fuel in addition to most of The Mystery Chef's recipes. Use and distribution of this book and of its contents will be restricted to companies supporting the broadcast, except that the right is reserved to the corporation to distribute the book in aid or extension of the broadcasting program. Participating companies are obliged to purchase a quantity of books in an amount at least equal to 5% of their domestic meters in service. On the basis of this ratio it is believed that the first edition of the book will be not less than 300,000 copies. Companies that do not sign up for the program prior to the first broadcast may come in later upon such terms as may be agreed upon by the directors.

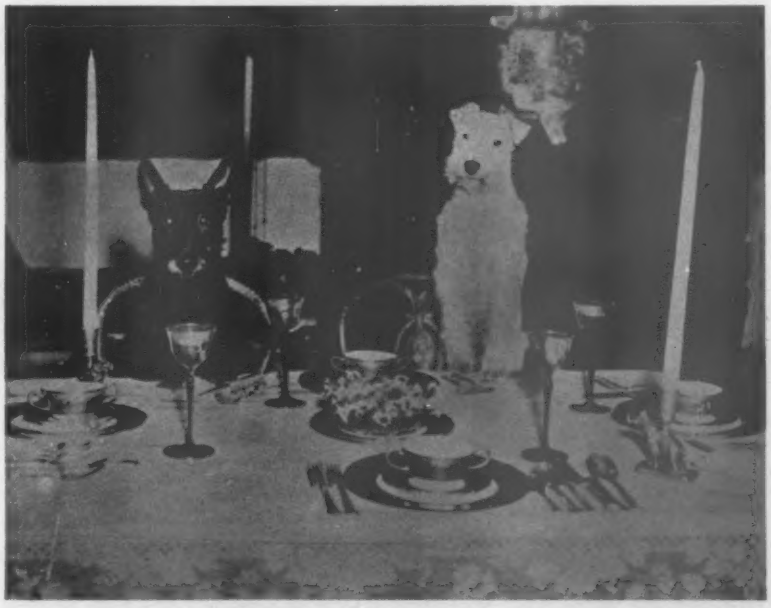
In making electrical transcriptions of The Mystery Chef's talks available to companies outside of the original broadcasting area, a flat fee per record will be quoted, based on the number of domestic meters in service. If any extension of the present network is called for, negotiations will be with Regional Advertisers, Inc., and arrangements can be made for the distribution of the recipe book as an integral and inseparable part of the program.

Following is the script of The Mystery Chef's opening broadcast:

ANNOUNCER: This morning we take pleasure in welcoming back to the air a radio personality who has built up an enviable position in radio and whose friends are numbered by the million. He is known to us all as the Mystery Chef. Who he is, he says, does not matter . . . . it's what he has to say that counts.

He is not a professional chef and never cooked a meal for pay. Although very much engaged in business all of his life, he has still found time to make the art of excellent cooking his favorite hobby and for more than 25 years has actually cooked every meal in his own home. Royalty, nobility, world famous people and friends from nearly every walk of life dine as guests at his table.

For five years the Mystery Chef broadcast for one sponsor. Since closing that series of broadcasts last December he has refused many offers to return. When he started broadcasting he made up his mind that money would never influence him to give you a recipe that he would not be enthusiastic about in his own kitchen, that he would tell you only about things that he wholeheartedly believed in. Now he returns to visit your home by radio under ideal sponsorship. Through the courtesy of many gas companies he comes to you to talk freely on the



Also present: The Mystery Chef's pals, Sandy and White Rock

whole subject of excellent cooking. Gifted with an unusual teacher's mind, he makes the art of excellent cooking easy for anyone. He has an almost uncanny way of imparting his knowledge to others in a way that assures success with every recipe attempted. His recipes are failure-proof because they are given in a way that makes it very easy for anyone to understand. With or without previous cooking experience, your success is assured.

Ladies and gentlemen . . . . I take great pleasure in presenting to you the famous Mystery Chef . . . . in person!

MYSTERY CHEF: Thank you, Mr. Grauer. Good morning! Thank you for honoring me by inviting me into your home. This is the first of a new series of talks which I hope will add greatly to the happiness of your home by helping you to develop the great talents you possess and by giving you a deeper realization of how great is your part in life.

I am exceedingly happy with my new sponsors and I come nearer to your home than ever before. I have no food product to sell and am free to talk on the art of excellent cooking in all its branches. The sole purpose of these visits to your home, by radio, is to render you a very real service and to enable you to easily prepare delicious meals in your home at low cost and to enable you better to build those sacred memories around your dining room table that will live on in the lives of your children and make them talk, in years to come, of those wonderful meals that mother used to cook.

I have said that I am exceedingly happy with my new sponsors because I am able to talk to you about the things I am enthusiastic about. The recipes I give will be only those that I use in my own kitchen and I am an enthusiastic user of gas for cooking. Four years ago I moved into my present penthouse. There was no gas, so I paid the landlord $78 to run gas lines into the apartment. That was long before I ever thought of having gas companies as my sponsors. I'll never tell you about anything because I'm paid to do so but because I believe wholeheartedly in what I am saying. You may differ from me and I will respect your opinion but I'm sincere in all my recommendations and they are based on practical experience.

I have prepared for you a delightful little book entitled "Be an Artist at the Gas Range." It is filled with hundreds of recipes for delicious though inexpensive dishes, and with other unusual cooking information that will prove priceless in your home. This little book, containing 100 pages, is new. It is not the same as the one given away during my last series of broadcasts. The book will be offered to you free by many gas companies and if you will listen at the end of this broadcast, Mr. Grauer will tell you when and how you may obtain your copy.

"Who I am," says the Mystery Chef, "doesn't matter. It's what I have to say that counts."

Almost every day the newspapers have been printing articles about the high cost of food. You and I know these things because we have to eat in order to live. We lose about 40 cents on every dollar we spend for food as compared with prices in 1933. The butcher, among others, is blamed unjustly. The prices he pays have risen higher than the prices he asks. If the butcher passed on the whole price raise, we would be worse off.

Through the courtesy of the many gas companies who are cooperating in these broadcasts I am going to show you how to overcome the high cost of food by giving you recipes that will enable you to make some of the most delicious dishes you ever tasted by using the least expensive cuts of meat.

I feel confident that I can help you to improve the meals on your table and at the same time show you how to save enough money to pay for the gas you use for cooking and refrigeration. I'm not talking about using cheap, inferior food or substitutes. I know that you can use the finest ingredients only and still be able to save money on your table.

How much was your butcher bill last week? Let me tell you about mine. We dined home every night and had guests one night. On that night there were four of us for dinner, but on the other six nights my darling wife and I dined alone. Each night I served a delicious dinner, a dinner that I would gladly set before any judge of excellent cooking, and yet my butcher bill for the entire week was so very small that if I were to tell you the amount many would think it impossible. But these things are not impossible. The very recipes I used to prepare those meals are clearly given in my little book "Be an Artist at the Gas Range," which will be available free of charge after December 15, at the offices of every gas company cooperating in sending you this service. Please *don't* write to me for the book. Of course I shall always be glad to hear from you but *don't* write to me for the book because I do not have any.

Between now and Christmas Day I have only five broadcasts and I will devote those talks to some of the recipes that will be most useful dur-

ing the holiday season. Whether your income is large or very small you will find recipes in my little book that will meet every requirement and meet any pocketbook. Whether the dish is exceedingly inexpensive or not the recipe will always result in a dish that is delicious. It isn't money that makes food delicious . . . . it's the recipe used and *you* the artist.

To the inexperienced and poor cook let me say a word of real encouragement . . . . *you* can at once prepare meals second to none. No long training is necessary. The All Wise and Loving Creator gave every man and woman the talents necessary to be an artist at the range. If you have failed in the past—forget it. There is *no* reason why you should ever have anything but complete success with everything you cook. If you have ever failed to have success I don't believe the fault was yours but with the recipe you were using. Either the recipe was faulty (and unfortunately there are thousands and thousands of faulty recipes) *or* the recipe was not completely clear as to its meaning.

During my last series of broadcasts, tens of thousands wrote to me telling how for years they have tried to make pastry but always without success. Some had tried for ten and even twenty years. Then they used my simple recipe and *at once* had success beyond their greatest hope. Doesn't that prove conclusively that the fault was not theirs when they failed, but with the recipe they were using? I gave them a simple recipe with directions that were crystal clear and *at once* they had success.

I tell you *no one* can cook better than you can—*no one*. You *are* a great artist and if you will only use the talents that you possess and use excellent recipes, there is no reason in the world why you should ever have a failure in cooking and you will find enjoyment and thrills in the preparation of meals that cannot be exceeded by any other of the arts.

Let me give you a recipe that will prove conclusively how easy excellent cooking can be made. It is the easiest recipe in the world for hot bread . . . . so easy that any child can use it with complete success. The recipe is for Scotch Scones. They are perfectly delicious and exceedingly inexpensive. Compare them with biscuits made with ready mixed materials. Compare the cost and you will find the saving will be enough to pay for all the gas you use to cook a big dinner and I am sure that you will find, as I have found, that the Scotch Scones are so much better that there really is no comparison . . . . and what is more, they are easier to make than *any* other form of hot biscuit. No shortening of any kind is used . . . . nothing to do but stir together, with a knife, flour, baking powder, salt and sugar (the sugar is optional), then stir in milk or milk and water. Listen to this easy recipe . . . . make some of these scones and I promise you the lightest, most delicious hot bread you ever tasted. I know that many expert cooks will think they cannot be light and short without any shortening. That is the surprising thing about this easy recipe. Although no shortening of any kind is used and although you can mix them quicker than I can tell you and quicker than you can make biscuits from ready mixed materials, the result will certainly delight you and the cost is so low that you can make a dozen large scones, 3 or 4 inches square, for 7¢ if milk is used and for 3¢ if water is used. Here is the recipe:

N. T. Sellman

H. H. Cuthrell

E. J. Boothby

F. D. Cadwallader

R. A. Malony

H. D. Polhemus

J. A. Weiser

J. H. Wells

C. W. Person

Officers and directors of Regional Advertisers, Inc.

SCOTCH SCONES

Ingredients required (makes 9 to 12 three-inch or four-inch scones, according to the size cut).

All Measurements Level

2 cups all purpose flour
4 teaspoons good baking powder
½ teaspoon salt
2 tablespoons granulated sugar (optional)
1 cup milk, or ½ milk and ½ water, or all water

Directions: Sift the flour, baking powder, salt and sugar into a large bowl and stir around with a knife to mix ingredients thoroughly. Then add the milk, or water, and stir and mix with the knife until combined in a rather wet dough. Then sift plenty of flour onto the table, or pastry board, and scrape the dough out of the bowl onto the center of the floured

(Continued on page 472)

Building the Natural Gas Load

By FRANK C. SMITH

President, Houston Natural Gas Company
Houston, Texas

Frank C. Smith

MY comparatively brief experience in the gas industry consists of management of a small, closely integrated system of several distributing companies, serving a rapidly growing area along the gulf coast of Texas, including one large city and some fifty smaller towns and villages.

From this picture are drawn three observations which, I believe, are in order under the subject assigned, "Building the Gas Load." These are:

1. Appliance Merchandising Policies and Public Good-Will.
2. The Development of the Industrial Load.
3. The Retention and Development of the Domestic Load.

Merchandising Policies

In discussing the first of these—"Appliance Merchandising Policies and Public Good-Will"—I know that we are all of one mind in admitting the need of more public good-will. I am sure you gentlemen feel as I do: that if ever an industry needed the wholehearted, active friendship and support of the business interest—that time is now.

However, in seeking to develop our business through appliance merchandising, we differ as to methods and policy.

I have found but few men included in my small acquaintanceship in the industry who approve of the plan of full 100% appliance dealer cooperation and "No appliances for sale" by the utility. On the contrary, there are far more who have favored or followed the utility merchandising plan.

I do not question the sales success of those who have, in the past, favored this utility merchandising policy. I have no doubt but that over a period of time they have perfected sales organizations which have produced a satisfying volume of appliance sales.

On the other hand, there are others who have by law been forced out of utility merchandising and have adopted and pursued an active program of 100% dealer cooperation and who, even if they could, would not now return to utility merchandising.

Dealer Cooperation

I am sure those who have, by choice or otherwise, abandoned utility merchandising and have wholeheartedly supported a full 100% dealer cooperation, are not only satisfied with sales results, but agreeably pleased with the good-will, business friendship and support which they now enjoy among merchants and business men they serve.

I am one of those who believe the truth of what has been proven before their eyes; that a carefully planned, properly organized dealer cooperation program, planned by the utility and submitted and promoted by it to the dealers throughout its territory, can get results in domestic load-building, distribution of high-grade, modern appliances, customer satisfaction and public good-will that will equal the load-building results attained by utility merchandising with or without dealer cooperation and far outdistance them in those other considerations of customer satisfaction, public good-will, and, of lesser importance, the necessity for investment of large sums in appliance inventories.

I believe it to be a fact, that where the utility has gone from non-merchandising to merchandising, the change came about not through the superiority of the utility merchandising program, but because the plan used in its dealer cooperation program was not a good one, if there was a plan at all. I believe a well-planned dealer cooperation program is vastly preferable to the best utility merchandising plan, with or without the sop of dealer cooperation. I cannot quite accept this theory that the utility must merchandise in order to keep up the quality of appliances sold and thereby keep down the cost of service. Human nature has changed if there lives one dealer who had rather make a small profit on a cheap gas range, than a better profit on a better one. Human nature has changed if there lives one housewife who prefers a low-grade range to a better one, if she can afford it.

"Well, what about it?"—you are asking. "What's *your* plan?" I have no plan to offer you. Don't mistake me, I have a plan, all right. It is a plan that makes every sales campaign carried out by our cooperating dealers surpass the benefits of the previous one; a plan that is increasing our domestic load steadily; that is paid for by the dealers and costs us only our time in planning; that has improved steadily the range and quality of the goods carried by these dealers since the utility began to pay some attention to them; a plan that has brought us friends in every town of our system, and not a single enemy. We think it's a good plan, and we take interest and pride in making it grow and move and develop as opportunities for its improvement are found. But I would not presume to submit this plan to you.

Re-study Essential

But, knowing you feel as we all feel the urgent need of every ounce of public good-will, particularly in these times, and, knowing that more than ever before we each realize the especial need of the friendship and support, of the business interests, merchants and their employees in our communities, I do submit to you an urgent plea—that a study of dealer cooperation plans be conducted by this Association—a re-study—for it has been done before; a re-study, with the newest in promotion, in advertising, in financing, all brought to bear on this problem; a re-study not stifled by preconceived ideas and intolerant conservatism content with the status quo; a re-study by a special committee

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Address before Natural Gas Department, A. G. A. Convention, Chicago, October 14, 1935.

which shall be interested in getting at the truth, with the good of the public in view, as well as the good of the gas industry.

Whether you are satisfied or dissatisfied with your own plan or program, I am sure you want the full facts—the full knowledge—that only a general survey and study can bring.

The second consideration I put before you, is the development of the industrial use of gas. This is a subject which I am sure most of you have given just as much or more consideration than I. What I have to say will largely reflect your ideas on this subject. From time to time there appear in the pages of the A. G. A. MONTHLY, and in the other 5 or 6 leading periodicals related to our industry, articles concerning some advancement in the application of the industrial use of gas. These are well worth while. But I have yet to find any ordered, coordinated effort on the part of any person or group to correlate and make available to our industry what is being done here and there by individual manufacturers of gas industrial appliances. And this I think to be another great need of our industry, to be met best through some agency of our Association.

Industrial Application of Gas

However little or much we may know about the industrial application of gas, we know that, generally speaking, it takes three forms:

1. Internal combustion engines.
2. Fuel, generally under boilers to raise steam.
3. Heat-treating processes, of a myriad of substances—from cooking vegetables in a canning plant to treating ferrous and non-ferrous metals.

Research and invention is proceeding continually, from the small manufacturer making laundry stoves for the back yard, to the greatest and costliest furnace for treating metals. My point is, these are proceeding separately and independently, as they should, but, so far as I know, they are never assembled, correlated and made available to you and me so that our industrial gas engineers and salesmen may go to gas users, whether actual or potential, and point out this new method, that new adaptation, these advancements in science and invention which research and experiment have brought to light. If such a service exists now, I have not been able to find it. I feel sure that you and your organization have wanted this. I know that I need it, and that my companies need it. If you agree, how shall we go about getting it?

In the electrical industry, three or four of the leading appliance manufacturers maintain experimental and research laboratories, each of them a gigantic institution in itself, one in particular almost a household word, cleverly advertised and publicized, but above all rendering invaluable and indispensable service to an industry in many respects our rival. Have we any institutions to match them? Are the problems and opportunities of the industrial application of gas being studied as are those of electricity? You know that they are not. And is there cooperation between units of the electrical appliance manufacturing industry? Does anybody think that it was a coincidence that each of the three separate electric range makes advertised in that 5-page color spread in July *McCall's Magazine*, employed the same heating element, Cal-rod?

I am sure you feel and I contend that the problems and opportunities of the industrial application of gas are the concern of every gas man who can sell his gas on a price basis competitive with other fuels and sources of power.

What we need is a central research laboratory, erected and maintained and supported by that section of our industry which will benefit from it, independent of any special influence, with able experimenters of scientific training, following the various lines of research in which our industry is concerned and making available to manufacturers such discoveries and improvements as they may develop. And through the same agency there should be collected and correlated facts already known about industrial gas appliances, adaptations and installations, with which your engineers and salesmen can put the load on your line, and let industry in general know that, after all, gas is a leader, an industry in the hands of men of vision and enterprise, not content, always, to play second fiddle. In my opinion, you have it within your power to bring such a

Early Sentiment Strong For National Advertising

AS this issue of "The Monthly" goes to press, November 27, companies having 2,342,000 meters in service on their lines have signed pledges in support of the proposed three-year industry campaign for the promotion of gas as a modern fuel for domestic, commercial and industrial purposes. These pledges have been received during the first eight days after the Committee on National Advertising, headed by Herman Russell of Rochester, N. Y., had solicited the gas companies for their contributions and had issued the pledge forms. The results are deemed eminently satisfactory.

In signing the pledges many companies have expressed an eagerness to proceed without delay in supporting a cooperative plan of advertising in accordance with the objectives outlined by the committee. These objectives, as stated by President Denning in his preliminary letter to companies, are:

1. **To maintain the present gas load and to increase future gas sales against competitive methods of producing heat energy.**
2. **To acquaint the American public with modern gas appliances, modern gas using equipment in industrial operations, and the best methods of gas heat application.**
3. **To correct the erroneous impression which some of our competitors are seeking to create in the public mind that gas in its various uses is not modern.**

Several Canadian companies have expressed a willingness to participate in the campaign.

The program of national advertising approved by the Executive Board of the Association at its meeting in Chicago, October 17, and now being developed by the Committee on National Advertising embraces a three-year project at a cost not to exceed $500,000 annually, and to be predicated upon participation by gas companies representing not less than 70% of the gas meters in the United States, at an annual cost not exceeding four cents per meter.

Members of the Committee on National Advertising, who are serving with Mr. Russell, chairman, are: F. M. Banks, Walter C. Beckjord, Davis M. DeBard, C. E. Gallagher, Conrad N. Lauer, Henry Obermeyer, Clifford E. Paige, James F. Pollard, Harold F. Smiddy, H. R. Sterrett, T. J. Strickler and P. S. Young.

situation into being. If you approve it, what will you do about it? As in the case of the dealer cooperation problem, a study of methods to attain the best end is imperative, and I know of no better time to lay the foundation and construct the framework of it than the coming administration year.

The third and final consideration in this subject of "Building the Gas Load" is "The Retention and Development of the Domestic Load." You will note there are *two phases* of this subject: the retention or protection of our gas load and the development of the gas load.

Roman Riders

I have no doubt that there are, here, representatives of combination companies, whose interests would not be served by resistance to this encroachment of electricity on the field now held by gas. It is barely possible that some gas men not in combination companies are yet influenced by affiliations with, and policies of holding companies which own or control both gas and electric properties.

I am well aware of the fact that there is a common ownership of both electric and gas utilities, there may be some covenant between the two against the invasion of the other's territory. I hope to offend none of these gentlemen, but what follows is related to my subject "Building the Gas Load."

There is an active effort by the electric industry to encroach upon our vital domestic load, the "kitchen load." I do not need to prove it to our friends from the T.V.A. area. One simple fact must certainly be clear—our customers are the electric industry's cooking load prospects.

I am not talking about what has happened in the past. I am not discussing the present ratio of gas and electric range sales. The gas industry has not been seriously hurt yet.

What I do want to emphasize is that our gas customers who produce our cooking load—our pay load—are being subjected to as great a barrage of publicity propaganda and advertising on electric cookery as any group of people ever received.

The electric industry—and in that term I include electric appliance manufacturers—are, through nearly every available medium of advertising and publicity, setting about to win our cooking load.

The housewife who uses your gas cannot pick up a magazine of national importance without finding some advertising or editorial publicity on electric cooking. The women's magazines are loaded with propaganda on this subject.

What is this doing? It is silently and gradually building up a public preference for electric ranges and electric cookery. It is silently, but none the less surely, weaning your customers away from gas as the modern cooking fuel.

This national advertising and subsidized publicity is sowing the seeds of dissatisfaction with gas in the minds of the housewives you and I

How To Use the Breathing Spell*

By F. S. WADE

President and General Manager, Southern Counties Gas Company, Los Angeles, Calif.

NOW that we are to have a "breathing spell" from outside interference in the conduct of our business, it is a good time to give critical thought to methods for improving our position with our customers.

F. S. Wade

The gas business has never lacked for ideas to better the way in which we do business. If we had a weakness it has been in the failure to carry out many of the improvements suggested by men who are close to the actual consumer. These matters have been ably discussed at numerous conventions; here are just a few of them:

What about our credit policies? During the sad years since 1929, many utilities have gained, sometimes unfairly, the reputation of being too "tough" in shutting off gas service for unpaid bills. Under the circumstances this has been inevitable. There is one thing, however, we could do that would eliminate many regrettable cases. A responsible employee, given sufficient authority to permit the exercise of individual judgment, should pass finally on every order to shut off a meter for nonpayment. The issuing of a final shut-off order should never be permitted to become a routine matter dependent solely upon the expiration of time.

Then there is the question of our requiring a deposit in advance to guarantee the payment of domestic gas bills. Preliminary investigation of the cost of handling consumers' deposits indicates that the increased loss, which might be expected if such deposits were waived from domstic consumers, would be only slightly in excess of the cost of this whole deposit business. If it were found practicable to waive the requirement of a deposit from domestic consumers, the gain in public esteem would be great.

The form, appearance and understandability of our gas bills deserve most careful scrutiny. Too much have these things been dictated by the convenience of mechanical bookkeeping; too little by the standpoint of the person who receives the bill and who wants to know how much gas he has used, what rate he is charged, and the time covered by the charge. If the bill form being used by your company does not show clearly—in a way that your most inexperienced consumer can understand—the period covered, the hundreds of cubic feet used and the rate per hundred, then it does not show the information that appears on practically every other bill he receives. The service of gas is a mysterious business at best and we can ill afford to have this mystery deepened by the bills we use.

Are we doing everything we can to make easy for our customers the routine necessary when they begin our service or end it? A recent examination of some of the application forms we use discloses that they are too legalistic and that they partake too much of the form of a contract where none could be made. It would pay us to study all of the forms that we ask our consumers to sign and eliminate, or revise, any language that is not simple and direct.

We hear of extensive plans for campaigns of national, or lesser, scope to improve the standing of the gas business. Important as such plans may be, it seems equally important that we use the time granted by the present "breathing spell," if such indeed we are to have, to check the little routine affairs of our business which, although routine to us, are the contacts that determine how the public feels toward us.

*Guest editorial reprinted from "Western Gas," November, 1935.

serve. It is building up in the minds of our patrons a favorable attitude toward electric cookery, that will ultimately lead to the purchase of electric ranges to replace the present gas range, unless counter education and publicity on gas is soon instituted.

Yes, I know present sales of electric ranges do not indicate this—but I repeat that I am not talking about what actual sales are being made now—this year—I am talking about the future gas cooking load.

I have here two exhibits showing all of the electric advertising and publicity which appeared in six national women's magazines during the first six months of this year—and likewise all of the gas advertising and publicity which appeared in the same six magazines in the same period. (Here two exhibits were shown.)

I submit to you gentlemen that our gas customers cannot be subjected to such a barrage of advertising, editorials, free publicity, month after month, year after year, without it building up a desire for electric cookery and electric ranges.

Your customers, our customers, are being carefully fed a diet of reading matter that will eventually turn them against us and our gas service—unless we soon take measures to counteract these forces.

We have the gas load now—we have public preference now—gas is the popular cooking fuel now—but we cannot expect to hold this public preference against such advertising and sales forces.

At the present time—because right now we do have the public preference—we can feature the modern gas range, create a desire to replace the old, obsolete, gas ranges and sell new modern gas ranges without running any great risk of creating a desire or demand for electric ranges. That is true only because our domestic customers are at present satisfied with gas as a fuel.

But let that time come when the public is favorably inclined to electric cookery, let that day come when your customers believe that the electric range and electric cookery is more modern and better than gas ranges and gas cookery; let that time come and it will be dangerous, if not impossible, to merchandise modern gas ranges and get a customer thinking about purchasing a new range without creating a live prospect for an electric range.

My point is: that unless we have national advertising and educational publicity comparable with the campaign now being conducted—and later to be intensified—by the electric industry, we are fighting a losing battle. The time to start protecting a market is when you have it.

I therefore submit that the time is here now to consider a comprehensive national educational and merchandising program designed to retain, as well as develop, our domestic cooking load; that will function and meet this danger, whatever merchandising policy is pursued.

Wins Award for Fight Against Utility Act

AT a meeting of the directors of The United Gas Improvement Company, Philadelphia, October 22, Vice-President Philip H. Gadsden was awarded the Samuel T. Bodine Meritorious Service Award. The award, established in 1925, was made to Mr. Gadsden for the manner in which he discharged his duties as chairman of the Committee of Public Utilities Executives. The committee represented the public utilities in vigorous opposition to the passage of the Wheeler-Rayburn Bill.

P. H. Gadsden

In addition to the Board of Directors, members of the U. G. I. staff were present to honor Mr. Gadsden. He was presented by Vice-President William W. Bodine to President John Zimmermann, who read the citation and made the presentation.

Mr. Gadsden's work, which won his company's highest honor, is described in the citation as follows:

"Early in February of this year the Committee of Public Utility Executives, of which you are chairman, was organized for the protection of the interests of the millions of consumers, workers, and security owners of the industry, as a result of the introduction in the Congress of the United States of the so-called Wheeler-Rayburn Bill. From that date until August 26, when the President of the United States signed the Public Utility Act of 1935, you were the courageous and able leader in the defense of liberty and right.

"Tactful and patient you maintained throughout, the wholehearted cooperation of the utility executives of the country, representing as they do diverse interests and problems.

"Insistent in your demand that full opportunity be given the industry to be heard, you secured from the House Committee on Interstate and Foreign Commerce adequate hearings for the presentation of testimony of the accomplishments of the holding companies and the contribution of the industry to the development of the nation.

"A fighter, but a fighter with a high concept of ethics and an unwavering fidelity to clean and above-board methods. You fought no defensive rear guard action. Backed by a devoted army you not only stood your ground, but fearlessly and with vigor attacked with the truth every unfair statement or inference from those bent on the destruction of the interests you represented.

"Throughout this trying period you consistently exercised clear wisdom, sound judgment, and forceful leadership, characteristics which had caused the utility executives of the country to unanimously select you to guide them through the greatest crisis the industry has ever faced."

Twelve Years' Experience in the Effective Administration of Resuscitation

Dr. C. K. Drinker

By CECIL K. DRINKER, M. D.

Professor of Physiology and Dean of the Harvard School of Public Health, Boston, Mass.

MY connection with the problems of carbon monoxide poisoning began in 1921 when Charles A. Monroe, then president of the American Gas Association, asked me to form a commission of "physiologists to consider efficient methods of artificial respiration in emergency cases of gas asphyxiation or carbon-monoxide poisoning and to recommend to the Association the best method to be used in such emergencies. Also to recommend as to the respective merits of manual and mechanical means of resuscitation."

The members of the commission were soon selected and at once went to work. The results obtained not only cleared the air of much nonsense relative to resuscitation but added a new emergency technique which has proved of the greatest value, the oxygen-carbon dioxide method of treating carbon monoxide poisoning. The commission reviewed the various manual methods of artificial respiration, and as former groups had done endorsed the prone pressure procedure. It examined experimentally various mechanical appliances submitted by manufacturers, most notably the pulmotor, and found nothing from these devices which was not provided more safely by prone pressure alone. As a result, the pulmotor and the lungmotor and less well-known relatives slowly disappeared.

During the past two years, devices similar to the pulmotor have again been placed upon the market—very ingenious mechanically and as attractive to lay groups as was the pulmotor. Again, such appliances lack physiological endorsement. They do nothing which cannot be accomplished more safely by the prone pressure method of artificial respiration, and each time such devices reach the market the immense amount of good work which has been done in creating efficiency and confidence in the prone method is to a degree lost. Let me remind you that as early as 1744 bellows were used alternately to drive air into patients and to suck it out, a tube being placed in one nostril to make the connection with the appliance. At the present time two outfits for this purpose dating back to 1782 are preserved in the museum of the Royal College of Surgeons in England. Whenever the results obtainable with such devices have been carefully examined the appliances have disappeared, and then after the lessons learned have been forgotten they invariably reach the market once more.

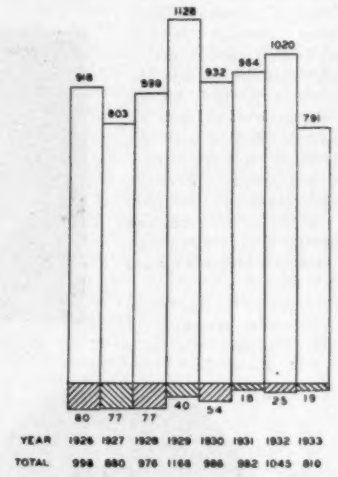


Figure 1. Columns indicate the total number of cases of carbon monoxide poisoning treated by emergency crews in New York by years. Shaded areas give the number of deaths occurring in treated cases. Early in 1929 the 5 per cent carbon dioxide and 95 per cent oxygen used for inhalation was replaced by 7 per cent carbon dioxide and 93 per cent oxygen

Shortly after the completion of the work of the 1921 commission, I was consulted by W. R. Addicks of the New York Consolidated Gas Company and eventually, in 1925, was asked to make observations and recommendations in the company's territory in New York designed to provide the best measures in resuscitation practice and to further the art by every means possible. In this work it was my good fortune to find myself under the executive control of a committee headed by Colonel Fogg, a group invariably sympathetic with the suggestions the field and laboratory taught us.

N. Y. Practice

Early in 1926, all the emergency trucks of the Consolidated and allied companies had been equipped with inhalators providing 5 per cent carbon dioxide and 95 per cent oxygen. Crews upon these trucks were given two periods of training yearly, the material covered being essentially a slight amplification of that contained in the American Gas Association Manual of Standard Practice in Resuscitation. Coincidentally with these new arrangements, a series of conferences were held with Dr. Daniel J. Donovan, representing the Police Department, and Dr. Harry Archer of the Fire Department. As a result of these conferences resuscitation practice was made uniform through all the agencies ordinarily involved in the rescue work of the city. The importance of this is great since, in the face of an accident, disagreement upon procedure causes delay and loss of confidence.

As time passed, literature became available which was sent to ambulance surgeons and to members of hospital staffs where gassed cases were received in numbers. These latter measures have resulted in less administration of useless drugs and more reliance upon artificial respiration and the inhalation treatment.

Address before General Session, A. G. A. Convention, Chicago, Ill., October 15, 1935.

TABLE 1

DEATHS FROM ILLUMINATING GAS POISONING IN NEW YORK CITY. STATISTICAL REPORT OF THE CHIEF MEDICAL EXAMINER OF THE CITY OF NEW YORK

Year	*Suicides*	*Accidental*	*Total (Suicide and Accidental)*
1926	371	812	1183
1927	457	611	1068
1928	520	567	1087
1929	582	502	1084
1930	616	413	1029
1931	636	298	934
1932	649	262	911
1933	531	197	728
1934	462	213	675

It is a fortunate circumstance that during the entire period this analysis covers, Dr. Charles C. Norris was medical examiner in New York, and so a uniform attitude toward the classification of cases has been maintained. It is possible to provide complete reports for fatalities during nine years, and these figures appear in Table 1. The important feature of this table is the drop in accidental deaths. To reduce the suicide rate in New York and to avoid the fact that carbon monoxide poisoning will probably always be a favorite means to this end is, I fear, beyond our powers. But there can be no doubt that due to the measures persistently followed in New York, the most distressing group of fatalities, those due to accident and ignorance, have become fewer.

Improvements Noted

To the improvements in resuscitation practice which have been outlined, other factors must be added. First amongst them was a practical cessation of sale of untested rubber tubing; second, was increased care in servicing and installing equipment; and third, was an increased knowledge by the public of the dangers of leaking gas. These three factors improving the situation in New York have the possibility of working in two ways. They might lessen the number of accidents due to carbon monoxide and they might lessen the severity of the exposure. Table 2 includes all the calls requiring the use of the inhalator responded to by the emergency crews of the Consolidated Gas Company of New York. The area is not quite so large as that covered by the report of the medical examiner summarized in Table 1, but is thoroughly representative. For the last two years there is a drop, which may be sustained, but in reduction of number of calls the gain has not been so consistent as has the reduction in the number of accidental deaths. Apparently prompter and more intelligent action in the presence of leaking gas has lessened the severity of exposure, improved the treatment, and lessened the number of deaths.

Figure 2. The Nielsen method of artificial respiration

The opportunity for observations in New York coupled with certain laboratory experiments in Boston caused T. J. Shaughnessy and myself to recommend, in 1929, that the oxygen—carbon dioxide mixture used in inhalation be changed from 5 per cent carbon dioxide and 95 per cent oxygen to 7 per cent carbon dioxide and 93 per cent oxygen. This change had an immediate effect which has been sustained and which is apparent in Figure 1. During the past year, 10 per cent carbon dioxide and 90 per cent oxygen have been tested, but with no results which have caused us to recommend the general adoption of this higher percentage of carbon dioxide.

TABLE 2

TOTAL NUMBER OF CALLS FOR THE USE OF THE INHALATOR RESPONDED TO BY THE EMERGENCY CREWS OF THE CONSOLIDATED GAS COMPANY OF NEW YORK

Year	*Total Calls*
1926	1639
1927	1461
1928	1652
1929	1991
1930	1801
1931	1709
1932	1705
1933	1450
1934	1492

Nielsen's Method

At the present time our interest rests with another advance in the art of resuscitation. In 1932, Colonel Holger Nielsen of Copenhagen suggested a new method of artificial respiration. This has now had thorough examination in Denmark and to some extent in other countries. Nielsen's procedure is shown in Figure 2. What he has done is to make a sort of combination of the Silvester and the prone pressure methods, shifting the operator to the head of the patient so that one person can take care of the accident. The prone method as we apply it exerts force to get air out of the lungs, and there is no doubt in my mind but that experienced operators force out all the air that comes in when the pressure is relaxed. The method has always been defective in that the inflow of air has had no assistance, depending simply on the elastic recoil of the parts previously subjected to pressure. By raising the arms, as in the Silvester method, the capacity of the chest is markedly increased and pressure exerted following this will result in forcing out an increased volume of air.

Trials of the method cause me to reject it in part. No one who has been a subject fails to notice discomfort as his breast bone is forced against a hard under surface when the operator exerts even light pressure on his back. More serious is my fear that ribs will certainly be broken if pressures of effective moment are used. At the same time, the arm lift is of undoubted

value. It supplies a forcible movement of air into the lungs which is lacking in the prone method. Accordingly, in New York we are trying a combination of prone pressure and the Nielsen procedure which is illustrated in Figure 3. Laboratory comparisons of the amounts of air moved by the prone method and the Nielsen method have been contradictory. Thus, in Denmark, the Nielsen method has been declared superior. In Canada, Wills Maclachlan has obtained the opposite result and recommends paying no attention to Nielsen's technique. It must be understood that measurements of the amounts of air moved by artificial respiration performed on a conscious subject are apt to be misleading unless the difficulties of the measurement are thoroughly appreciated. Such subjects invariably breathe for themselves and this air is added to that moved by the operator. Also, some subjects resist markedly and the operator moves no air at all. Laboratory examinations cannot be conclusive unless performed on unconscious, nonbreathing subjects, an obvious impossibility. They can merely indicate the probable direction in which to progress and must be supported by field experience.

Using this combination of the Nielsen and prone pressure methods in the Laboratory, it is our impression that an improvement is gained over the prone method. Accordingly, it has been recommended that the unaided operator give prone pressure artificial respiration as in the past, and that when assistance arrives a second operator provide the arm lift, raising the arms as the prone pressure operator relaxes his pressure and letting them fall as pressure is re-exerted.

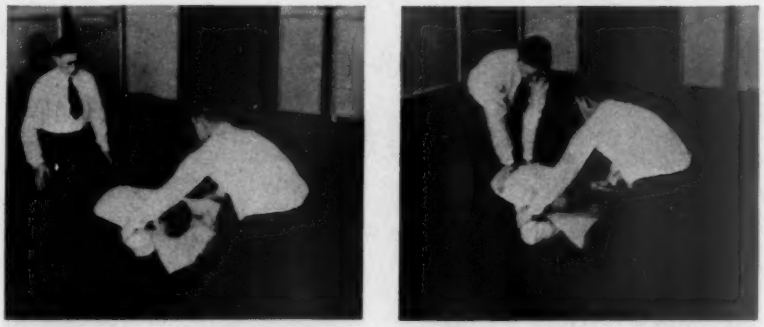


Figure 3. Combination of the prone pressure and Nielsen methods. When the prone pressure operator releases pressure the arms are lifted and are allowed to fall when pressure is again applied

Combination Method Merits Field Trial

The same combination of Nielsen and prone methods is being used in the French Navy and certainly merits field trial in this country. It relinquishes nothing of the experience we have had in the prone method—merely adds an extremely simple and logical step to it. When field experience has accumulated, our opinion as to this modification may change, but to condemn without field trial is tantamount to holding that in the prone method we possess a perfect and unimprovable technique past which no progress can be made.

The opportunities for study of carbon monoxide poisoning in New York have led recently to an examination of what happens to these cases. There are two lines in which claims for injury due to carbon monoxide usually fall. The claimant declares that his heart and circulation have been ruined by the episode of poisoning or, second, that poisoning has brought on a train of neurological sequelae of many different sorts. Thus I have been consulted by member companies for my opinion as to heart disease and high blood pressure following gassing. These are circulatory sequelae, and as yet no direct evidence can be offered in regard to them though I am sure such results are extremely infrequent and follow only very severe exposure to gas; but from the side of nervous and mental conditions developing after gassing, even more inquiries have come to me. Convulsions, insanity, loss of memory, impotence, hysterical outbreaks of all sorts are blamed upon exposures to gas that have not caused unconsciousness—sometimes not even headache.

With the assistance of my collaborators Dr. F. H. Shillito and T. J. Shaughnessy, something definite can be said about the nervous and mental sequelae

TABLE 3

TOTAL ADMISSIONS IN TEN-YEAR PERIOD IN MENTAL HOSPITALS SERVING NEW YORK METROPOLITAN AREA, INCLUDING PSYCHOSES DUE TO CARBON MONOXIDE INTOXICATION

Fiscal Year	*State Hospitals*						*Total*	*Carbon Monoxide Cases*
	Manhattan	*Brooklyn*	*Hudson River*	*Central Islip*	*Kings Park*	*Rockland*		
1925	2,529	1,043	717	1,321	1,221	——	6,831	2
1926	2,221	1,274	793	1,324	1,098	——	6,710	1
1927	2,363	1,406	734	1,667	1,119	——	7,289	4
1928	2,317	1,529	788	2,020	1,277	——	7,931	1
1929	2,297	1,523	819	2,008	1,107	——	7,754	1
1930	2,317	1,629	841	2,017	1,302	——	8,106	8
1931	2,223	1,606	907	2,170	1,150	1*	8,057	7
1932	2,358	1,543	829	2,027	1,290	795*	8,842	4
1933	2,004	1,917	721	2,261	1,663	1,457*	10,023	4
1934	2,531	1,895	634	1,933	1,551	1,572*	10,116	7
Total	23,160	15,365	7,783	18,748	12,778	3,825	81,659	39

*Exclusive of transfers.

of gassing. First of all, it must be remembered that there is a large literature describing brain lesions in men and animals killed by carbon monoxide. But this is the pathology of fatal cases. It does not necessarily follow that similar lesions but of less degree are present in cases recovering from acute poisoning, and this is the point upon which information is needed.

Given some thousands of cases of exposure to carbon monoxide, how many recover from the acute episode and then show nervous or mental derangement? During the past spring and summer it has been possible to go over the records of 21,000 instances of exposure to gas occurring in New York between 1925 and 1934. When these cases are severe they are taken to a near-by hospital where they are treated and eventually discharged to home or if necessary to another institution. In New York City, it is the fact that non-private patients—and these cases are invariably in that group—who require hospitalization for nervous or mental disease are sent to one of seven different state hospitals in the neighborhood of New York. Accordingly, the records of these institutions were searched for cases owing their disease to carbon monoxide poisoning. The results of this research, which was carried out with the greatest thoroughness, disclosed 39 instances of psychoses or nervous disease due to carbon monoxide poisoning in the years 1925 to 1934, inclusive. During this time there were 81,659 admissions in the 7 institutions involved, and but 39 of these were ascribable to carbon monoxide—surely evidence that this gas is of little significance in contributing to our burden of nervous and mental disease. Furthermore, these 39 instances arose from over 21,000 exposures to gas.

Table 3 summarizes these findings. Four other instances of neurological sequelae were added by examinations of records before and after the ten-year period covered in Table 3. The hospital records of the 43 patients discovered in this search were very complete, and to the records in many cases it has been possible to add reports of emergency crews describing the circumstances of the accident and the condition of the patient when discovered. Certain important data are available from these descriptions. First of all, profound and often prolonged unconsciousness characterizes the episode of poisoning if mental or neurological sequelae appear. Thus one finds in the records "unconscious 2 days," "unconscious 4 days," "for several days lapsed off into semi-consciousness," "resuscitated after eight hours," etc. It can be taken as fact that unquestionable nervous or mental disease requires carbon monoxide poisoning of the severest sort. Patients who show such conditions have narrowly escaped death and have been resuscitated with difficulty even though the best possible methods were employed. It is self-evident that if such sequelae followed mild gassing, neurological clinics and nervous and mental hospitals in and around New York could produce many such patients, and this is not the case. Second, and with this I was not familiar, the onset of nervous or mental symptoms following poisoning is variable. In the total of 43 cases, 19 had after-effects within the first week, 13 had a clear period, and in 11 the time of onset was not defined. By a clear period, I mean that 13 of these patients apparently recovered completely from severe acute poisoning. Often they were discharged from the hospital, and in some instances returned to work. Secondary symptoms necessitating hospitalization developed about the tenth day.

An illustrative case is as follows:

Case 1

Female, aged 51. Found unconscious due to gas and remained so in hospital 40 to 50 hours. Discharged to home on sixth day with no complaint except slight weakness. Two weeks later her gait suddenly became unsteady and her mental state changed from clarity to bewilderment. She was again hospitalized, and eventually placed in an institution for nervous and mental disease where during 3 months she began to improve and after another month was paroled. A year later she had recovered completely and was discharged.

Such descriptions may be multiplied, and are not complicated by lawsuits nor by efforts to obtain compensation.

Another matter of moment is the

A. G. A. Scholarship Awarded at Purdue

K. L. Farr

R. C. Dyrenforth

THE American Gas Association scholarship at Purdue University, Lafayette, Ind., has been divided this year equally between Keith LeRoy Farr and Robert Collins Dyrenforth, according to an announcement by the Dean of Engineering, A. A. Potter. The scholarship at Purdue University is maintained from the income of the Trustees Gas Educational Fund which was turned over to the custody of the Association some years ago with the understanding that it would be used for educational purposes.

The students selected for this year's scholarship are of exceptionally high calibre. K. L. Farr was born in VanBuren, Indiana, on April 13, 1914. His superior record in high school won him a county scholarship when he entered Purdue University in September, 1934, to take up the study of chemical engineering. In addition to earning all of his expenses since entering college, he has maintained a scholastic position in the best fourth of his class.

Mr. Farr expects to complete the requirements for a degree of Bachelor of Science in chemical engineering in June, 1936. He is specializing in gas technology and is now working on a thesis which should prove of value to the gas industry.

Mr. Dyrenforth was born on April 22, 1915, in Riverside, Illinois. He graduated from high school with an average grade of 90 and entered Purdue University in September, 1932, to take up the study of mechanical engineering. His outstanding record has resulted in a distinguished rating award nearly every semester. He has recently been elected to the honorary mechanical engineering fraternity. He is also devoting special attention to the study of gas technology and is working on a research project which is expected to produce valuable data for the gas industry.

eventual outcome in our 43 patients. Within two years after the onset of nervous or mental symptoms, 23 of the patients recovered completely, 11 died during the 2 years, usually of intercurrent disease, and 9 had permanent after-effects. These are the points of most practical importance to the gas industry. The entire study will be published in the *Journal of the American Medical Association* during the coming winter, since it has been thought wise to place these facts before the medical profession as forcibly as possible.

In conclusion, let me point out that I have titled these remarks "Effective Administration of Resuscitation." Nothing in medicine or engineering is ever effective if it ceases to be the object of thought, of observation, and of experiment. There is a saying of Confucius which is very much to the point.

Confucius' Wisdom

"The ancients, who wished to exemplify illustrious virtue throughout the Empire, first ordered well their own states. Wishing to order well their own states, they first regulated their families. Wishing to regulate their families, they first cultivated their persons. Wishing to cultivate their persons, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they first extended to the utmost their knowledge. Such extension of knowledge lay in the investigation of things.

"Things being investigated knowledge became complete. Their knowledge being complete, their thoughts were sincere. Their thoughts cultivated, their families were regulated. Their families being regulated, their states were rightly governed. Their states being rightly governed, the whole Empire was made tranquil and happy.

"It cannot be, when the root is neglected, that what should spring from it will be well ordered."

All of the material I have presented has been the result of laboratory and field investigation, in much of which it has been my good fortune to take part. In the fulness of time every one of us will die of oxygen lack. The lessons we can learn as we reduce the dangers of carbon monoxide poisoning can be read into other fields in medicine. For example, it was from this work in New York that my brother developed the interest and stimulus which resulted in the invention of the Respirator, a device occasionally valuable in gas poisoning but indispensable in the treatment of more dreadful types of asphyxia. In the next ten years it is your duty not only to back and extend the beautiful work of your own testing laboratory, which has done so much toward improving the safety of gas appliances but you must see to it that you are dissatisfied with the available methods of treating gas poisoning and then, like Confucius, you will turn to the problem of extending your knowledge, and this extension "will lay in the investigation of things."

Commends Recognition in Field of Public Relations

THE following editorial from the November issue of *Byllesby Management* emphasizes the renewed interest in that time-honored subject of employee-customer relations:

It is significant that the achievement for which the 1935 Charles A. Munroe Award of the American Gas Association was conferred was the development of an employee-customer contact training program. This is the first time the award has been given for an accomplishment in the field of public relations, and undoubtedly is recognition of the urgency, at this particular time, of building more favorable customer attitudes. The winner, announced at the American Gas Association Convention in Chicago last month, is Frank L. Hallock, director of the public contact division of the Consolidated Gas Company of New York, who, building upon the Gas Association's course in employee-customer relations, evolved in the last four years a practical and continuing plan for developing a strong and loyal force of informed and courteous employees who know how to deal with the public.

The continuous nature of the Consolidated Gas plans is one of its strong characteristics, and one that other utility companies may profitably imitate in their training programs. There is in the plan no unrealizable aspiration to evolve so well trained a working force that some day the object of the program may be considered accomplished—realities are faced and the fundamental theory is that public relations are improved only by everlastingly striving to improve them.

The plan has constantly in mind the individual employee. Methods used bear no resemblance to so-called "pep" talks or "school room" tactics. Rank and file employees are selected and trained to serve as leaders of small conference groups. The conferees are encouraged to present reports of actual contacts with various types of individuals and with outside organizations. The actual contact experience is studied by the group, analyzed in the light of theories studied, and an ideal manner of handling a similar situation is decided upon.

The necessity of having employees well posted on company activities and policies is recognized in the training program. A regular monthly publication is considered the most effective means of accomplishing this. Employees are encouraged to ask specific questions concerning the company and its services, and all questions, regardless of their nature, are answered in the publication in a complete and understandable manner.

A manual of practices and procedures to guide them in their work was prepared by employees themselves, under Mr. Hallock's direction. Because this manual has grown from their own suggestions, the employees are much more interested in it than if it consisted of rules prepared and issued as executive orders.

The plan has many other features, but fundamental in all of them is the idea that teaching of customer contact technique should be handled as if it were a fine art—which it is—and employees made to feel personal enrichment through the knowledge they gain of human nature. Obviously, this knowledge not only enables them to derive more satisfaction and pleasure from their business contacts with customers, but is advantageous in all their social activities. Employees may even be trained to relish an encounter with an extremely soured individual, feeling as much pride in coping with and overcoming his unreasonableness as a diplomat would in restoring friendly feeling between two nations after a dispute. The same technique is involved. The employee who handles utility customers' complaints in such a manner that the customer is kept friendly, or re-won to friendship, must be a master of diplomacy and enjoy practicing his art. Contrary to the *laissez-faire* conception, however, employees do not come by this sort of skill naturally. Some are more apt in acquiring it than others, but all need constant tutoring and encouragement.

Gas Sales as Affected by Temperatures

PART 2 —Theoretical Analysis and Practical Method of Determining Weighted Average Temperatures and Billing Periods

By H. P. SMITH and S. J. HELFMAN

Rate Department, Equitable Gas Company, Pittsburgh, Pa.

THE first part of this article, which appeared in the October issue of THE MONTHLY, discussed the importance of adjusting the reported statistics of residential gas sales for the following two factors: (1) the effect of atmospheric temperature upon the quantity of gas consumed, and (2) the variation in the period covered by the reported monthly statistics, due to the prevailing policy of "rotating" the meter reading schedule. The authors presented a graphic method of adjusting for these factors, and a typical application to the study of trends of average sales per consumer.

In the second part of the article, which follows, there is presented a theoretical analysis of the concept of "weighted average temperature" and "weighted average billing period," and the actual statistical procedure used in the calculation of these two factors.

Practical Metering and Accounting Requirements Necessitate Use of Composite Billing Period Instead of Calendar Month

The number of residential consumers on the distribution systems of most gas utilities is relatively so large that the utility companies must necessarily read the residential meters on a rotating schedule. That is, instead of reading all meters on a single day, the number of meters is prorated over all the available working days in the month. If, for example, there are only 22 working days in the month, approximately 1/22d of the total number of meters is read each day. Furthermore, individual meters are read in approximately the same order each month. Thus, meters that are read on the 7th, let us say, of one month are subsequently read on or about the 7th of the following month, and the specific consumers affected become accustomed to having their meters read on or about that date. Of course, if the 7th happens to fall on a "non-working day" such as Sunday or a legal holiday (and also Saturday in the Equitable Gas Company territory), then the meter-reading date for these consumers is displaced a day or two. There is also another circumstance which causes displacement in meter-reading date—namely, that in months having different numbers of working days (i.e., meter-reading days) the number of meters to be read per day will differ accordingly, and the number of days required to reach any specific meter on the system may vary from month to month because of this factor alone.

General Accounting Practice

It is the general accounting practice of gas utilities to report as the residential gas sales for any month the aggregate consumption shown by the meter readings made within that month, and to bill the consumers for that month on the basis of these meter readings. Actually, however, a considerable part of the sales reported in any month represents gas delivered and consumed in the preceding month. For example, meters read in the early part of the month show consumption all the way back to the early part of the preceding month; and consequently most of this indicated consumption occurred in the preceding month. Correspondingly, meters read about the middle of the month show consumption which occurred all the way back to their last meter reading dates, near the middle of the preceding month, and the number of days in which the consumption actually occurred is divided roughly half and half between the two months. The relative proportion of this division changes progressively as we advance to the later meter reading dates, so that for the meters read on the last working day in the month, only a minor portion of the indicated gas consumption occurred in the preceding month, leaving the major portion occurring in the current month. The aggregate of all the meter readings made in any month, therefore, is made up of gas which was delivered and consumed over various portions of some 60 days, more or less (depending on the lengths of the two months).

The effect of the above-described rotation of meter readings, combined with the variations from one month to the next in total days, working days, and number and date of Saturdays, Sundays, and legal holidays, has the result of producing appreciable variations in the periods covered by the various meters read during the month. The composite time effect of all these individual meter-reading periods (or billing periods, since bills are based on meter-reading periods) is mathematically equal to their "weighted average," and represents the time factor which should be used in adjusting the reported monthly sales. Of course, the calculation of the weighted average of a hundred thousand or several hundred thousand individual items each month would be a formidable task, but no such detailed procedure is necessary, as will be demonstrated below. Very satisfactory results may be achieved by a comparatively simple calculation, which is as accurate as practical conditions will require.

Atmospheric Temperatures Correlated with Billing Periods of Composite Months

Along with the differentiation in billing periods resulting from the rotation of meter readings, there is a related differentiation in spread of atmospheric temperatures. Gas consumption which occurred in a billing period extending from the 7th, let us say, back to the 7th of the preceding month is affected by the daily temperatures in that period; while gas

consumption occurring in a billing period from the 15th back to the 15th is affected by the daily temperatures of that particular period. Of course, certain days' temperatures are common to both billing periods (as well as other billing periods also) because of the overlap, and it is this fact which points the way to the mathematical treatment used in the solution of this problem, as is demonstrated in the next section.

Before proceeding to this demonstration, or analysis, however, the point should be noted that for each and every billing period terminating in any month (and therefore entering into the reported monthly sales) there is a specific related sequence of daily temperatures, and that there is a progressive overlapping of these temperature sequences in exactly the same manner as there is a progressive overlapping of their associated billing periods. The specific problem, dealt with in the following analysis, is how to properly combine these temperature sequences so that they will result in a composite temperature factor, related to the composite time factor (weighted average billing period) and to the reported monthly sales.

Theoretical Analysis of the Weighted Average Billing Period and the Weighted Average Temperature

(1) CONCEPT OF "METER READING UNITS"

This analysis is diagrammatically illustrated by the accompanying Chart 4, in which are represented the calendar months of January, February, and March, 1929. This diagram is drawn in accordance with the metering schedule and accounting practice which prevailed in the territory of the Equitable Gas Company at that time. In 1929 (and in fact in all the subsequent period up to and including November 10, 1933) meters were read on all days except Sundays and legal holidays. Thus, January had 5 non-working days (consisting of 4 Sundays and 1 legal holiday) and consequently 26 working days. Similarly, February had 23 working days, and March had 26 working days.

The total number of meters to be read in January was therefore divided by 26 to give the number to be read per day. While, in actual practice, the number to be read on each working day in a month is not precisely the same throughout the month, it approaches uniformity so closely for a system where the total number of meters runs into the tens of thousands and even hundreds of thousands, that the differences may be assumed as negligible within the range of this study. It may be considered that on each working day in January, 1/26th of the total number of meters was read; on each working day in February 1/23d of the total number was read; and in March again 1/26th of the total was read per day. If the total number of meters were 119,600 (a hypothetical figure assumed for this example) then the number read per working day in January would be 1/26th of 119,600, or 4,600 per day; the number read per working day in February would be 1/23d of 119,600, or 5,200 per day, and the number per working day in March would be the same as in January, namely 4,600. For purposes of demonstration it is assumed that the total number of meters, namely, 119,600, remains unchanged during the three-month period, but this need not be the case in actual practice. The principles developed apply as well where the number of meters changes from month to month.

The number of meters read per day is considered as a "meter-reading unit." Continuing with this example, a unit in Jan-

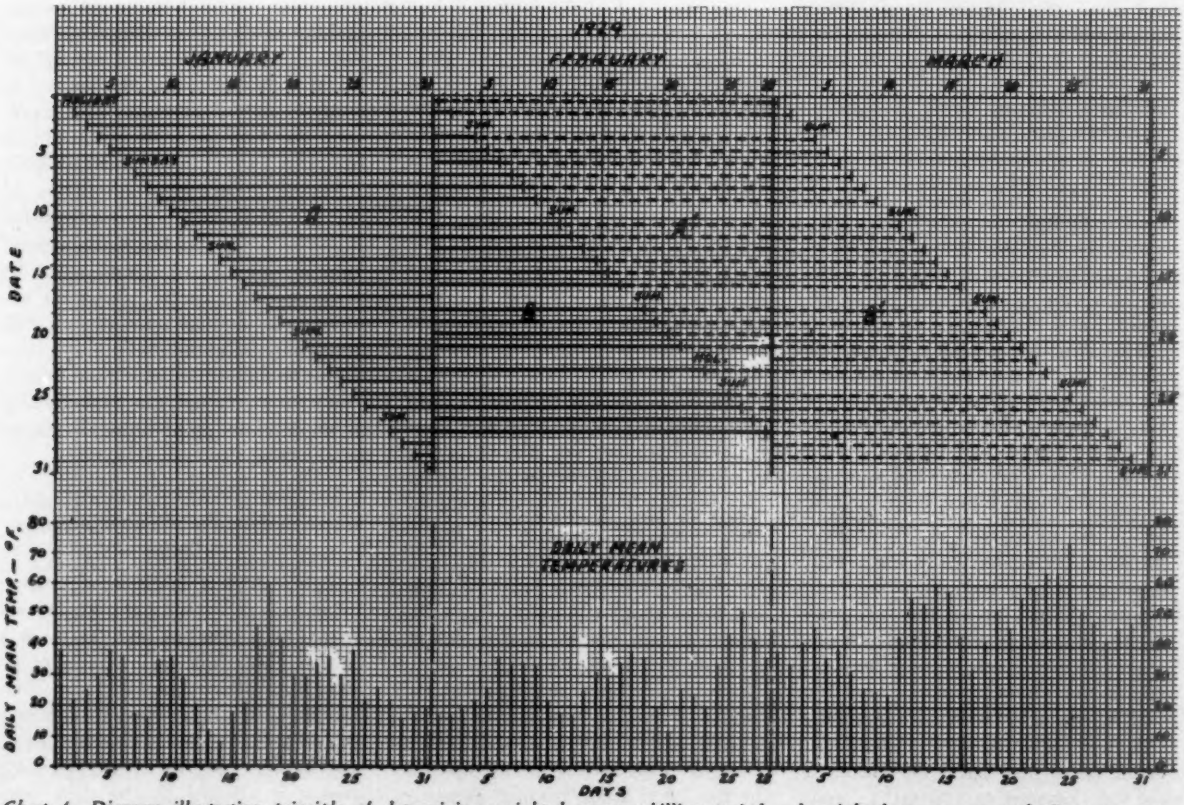


Chart 4. Diagram illustrating principle of determining weighted average billing period and weighted average atmospheric temperature corresponding to reported residential sales

uary numbered 4,600 meters; a February unit was 5,200 meters, and a unit in March was 4,600 meters. The problem is further simplified by treating a meter unit as though all of its meters were read at noon of the working day—which is very close to the actual median of the unit, since noon is about the middle of the meter reader's working day in the field. This simplification of the unit, of course, divides the calendar day into halves, and explains the appearance of halves in the calculations which appear later.

(2) GRAPHIC ALLOCATION OF REPORTED FEBRUARY "SALES" TO OCCURRENCE IN JANUARY AND FEBRUARY

In Chart 4, a dot is shown at noon of each day on which meters were read in January, February, and March. Horizontal lines are drawn to symbolize the gas consumption of individual meter units. The solid lines, which in the aggregate resemble an approximate parallelogram covering contiguous portions of January and February, represent the gas consumption appearing in the February meter readings and reported by the accounting department as February "sales." Similarly, the dotted lines, forming a rough parallelogram which covers adjacent portions of February and March, represent the gas consumption entering into the March meter readings and reported March sales. For the purpose of this discussion, the solid lines appearing in January will be referred to as the A lines, and those in February as the B lines. Likewise, the dotted lines in February will be designated as the A′ lines, and those in March as B′. These four designations are shown on the chart in their appropriate places.

(3) PORTION OF FEBRUARY "SALES" WHICH WAS ACTUALLY CONSUMED IN JANUARY

Referring to Chart 4, it will be noticed that there are no dots or lines corresponding to Sundays or legal holidays, since no meters were read on those days. January 1 (New Year's Day) furnishes the first instance of this kind. On January 2, however, the first unit of 4,600 meters is read (continuing the above example); and the A line extending from noon of January 2 to the end of the month (which is marked off by a boundary on the chart) is 29½ days long. This indicates that, for this particular unit of meters, there are 29½ days' consumption of gas in January which will appear in the February meter readings and bills. On January 3, another unit of 4,600 meters is read; the A line extending from noon of January 3 to the end of the month is therefore 28½ days long, indicating that only 28½ days' consumption of this unit occur in January, to be included in the February meter readings. Continuing this procedure through January, we find that the length of the A lines from the successive dots to the end of the month grow progressively shorter, the line for the January 30 meter unit being only 1½ days long, and that for the January 31 unit being but ½ day long. In the aggregate these A lines (which present an approximate triangle formation on the chart) represent all of the gas which was delivered and consumed in January, but which appears in the February meter readings, bills, and accounting reports.

(4) PORTION OF FEBRUARY "SALES" WHICH WAS ACTUALLY CONSUMED IN FEBRUARY

Now, let us pick up on the charts the gas which not only appeared in the February meter readings but was also consumed in February—in other words, the remainder of the gas appearing in the sales report for February, in addition to the amount just described as having been consumed in January. February 1 is the first working day in the month. At noon of the 1st, the first February meter unit, numbering 5,200 meters, is read; a B line ½ day long indicates that this unit includes ½ day's gas consumption from the end of January to noon of February 1. At noon of February 2, the second unit of 5,200 meters is read; a B line 1½ days long shows the number of days' consumption by this unit in February up to the time of meter reading. The next day, however, is a Sunday, and no meters are read; this fact is indicated by a space opposite February 3, and the omission of any line for that date. But on Monday, February 4, meter readings are again resumed, and a B line 3½ days long for that unit indicates 3½ days' consumption which appears in the February meter readings. As this progression is continued, it is obvious that the B lines from the end of January to noon of the successive working days, grow progressively longer—the B line, corresponding to the February 28 meter unit being 27½ days long.

(5) SUMMATION OF JANUARY AND FEBRUARY PORTIONS OF REPORTED FEBRUARY SALES

Recapitulating, the total of the A lines, comprising the "A triangle," represents all of the gas delivered and consumed in January, but included in the February meter readings and sales reports; the total of all the B lines, or the "B triangle," represents all of the gas appearing in the February meter readings which is also delivered and consumed in February. The summation of the A triangle and the B triangle, therefore, accounts for *all* of the gas appearing in the February meter readings and sales reports. This totality is irrespective of the identity of individual meters in the January and February meter units.

The first February unit of 5,200 meters may be considered as including all 4,600 meters which were last read in the first January unit, plus 600 of the meters which were read in the second January unit (on January 3). But even if it were not possible to identify the same meters as appearing in the first January unit and the first February unit, it would be immaterial as far as the mathematics of this problem is concerned. The significant thing is that *all* of the gas indicated by the February meter readings is indicated by the summation of the A and B lines.

(6) RELATIVE WEIGHT OF DAILY MEAN TEMPERATURES (UPON REPORTED SALES) EXPRESSED AS "METER DAYS"

At the bottom of Chart 4 vertical lines indicate the magnitude of the daily mean atmospheric temperature on each day of January, February, and March, 1929. Each temperature line is diagrammatically shown as a single line at the middle of its day, for purposes of representation only; but in this analysis the influence of any day's temperature is properly treated as extending to all gas consumption occurring within that day. For example, the temperature of 36° F. on January 10 affects all gas consumption from midnight of the 9th to midnight of the 10th—but, for the purposes of the next step in the analysis we are concerned only with its effect on the A consumption—that is the consumption falling into the February report. Graphically, the portion of the A consumption affected by the temperature on the 10th is indicated by the summation of all A lines (reading vertically on the chart) which are contained between midnight of the 9th and midnight of the 10th. This summation is 7½ unit-days' consumption—in other words, all of the consumption on that day of the first 7 meter units, plus half of the consumption of the eighth unit. Since a January meter unit consists of 4,600 meters, this summation is equivalent to $7\frac{1}{2} \times 4{,}600 = 34{,}500$ "meter-days" of gas consumption. By a similar reasoning, we may see that the temperature of 29° on January 11 affects 8½ unit-days of the A consumption, or $8\frac{1}{2} \times 4{,}600 = 39{,}100$ "meter-days" of consumption. The values 34,500 and 39,100 represent the relative weight to be given to the temperatures on January 10 and 11 respectively, in evaluating the aggregate effect of these temperatures upon the sales appearing in the February report.

A simple tally on the chart reveals the "A weights" to be given to each separate daily temperature in January. Thus, the weight of the January 1 temperature upon the A portion of consumptions is 0; the weight of the January 2 temperature is ½ unit-day (or 2,300 meter-days); the weight of the January 3 temperature is 1½ unit-days (or 6,900 meter-days), etc.—these daily weightings growing progressively larger as we go forward, until finally, we reach a weight of 25½ unit days (117,300 meter-days) for the temperature on January 31. (As a feature of interest, it should be pointed out that the temperature on a non-working day has a unit-day weight which is a whole figure, since there are no meter readings on that day to split the consumption of a unit. For example, the weight on Sunday, January 6, is 4.0 unit days.)

(Continued on page 473)

Vigorous Discussion Marks Wisconsin Technical Meeting

T. J. Danehy

ROUND table discussions, continuing for an entire day's session, featured the convention of the Technical and Operating Section of the Wisconsin Utilities Association at Green Bay, November 11 and 12.

It was the first time a round table experiment, covering gas production, distribution, services and meters, and servicing appliances, was tried by the Gas Division of the Section.

T. J. Danehy, manager, Wisconsin Fuel & Light Co., Manitowoc, was elected chairman of the Gas Division, succeeding L. P. Ziebell. E. C. Brenner, Milwaukee Gas Light Co., was elected vice-chairman.

The convention attracted 261 registered gas and electric technical men.

Phil S. Hanna, editor of the *Chicago Journal of Commerce*, who spoke at the joint dinner, advised utility men to dare to risk jail in their effort to explode the half-truths that are being broadcast by politicians.

Following are extracts from papers presented at the meeting:

Revenues and Taxes

L. P. Ziebell, Green Bay, chairman of the Gas Division:

Gas companies in Wisconsin today are serving the greatest number of customers in their history. A 3% gain in number of customers was registered last year and 1935 gives promise of showing still further gains. Since 1929 Wisconsin gas companies have increased their total number of customers about 5% and today about 45% of the families in Wisconsin are users of gas.

While the gas industry has been able to about hold its own in sales and has increased the total number of customers, yet the trend of net income available for dividends and surplus is downward. Operating expenses, due largely to increased costs of fuel and labor, have increased this last year about 8%. Net income for the gas industry as a whole for 1934 was 28% under 1933.

In view of the ever-increasing governmental expenditures, it looks as though the end is not as yet in sight; in fact, during this past year the gas utilities in Wisconsin were assessed 3% to help carry part of the relief load. Today Wisconsin utilities are paying close to 17¢ out of every dollar they take in to various governmental bodies as taxes. In 1928 but 11.7% was taken by taxes. Taxes paid by Wisconsin private utilities in 1934 totalled $7,271,621. Total taxes *set* up by municipal electric utilities in the state totalled only $173,536—a percentage to gross of only about 5%, and it must be remembered that these taxes were set up and may not in all instances have been actually paid.

Gas Flood Lighting

W. M. Blinks, General Gas Light Co., Kalamazoo, Michigan:

One year's practical experience with gas flood lighting has indicated its superiority over electric flood lighting, and has set the gas industry to thinking it can recapture street lighting. As an outgrowth of experiences with gas flood lighting a very promising system of industrial indoor lighting has been developed.

The gas industry right now has what the electric industry will announce in the future as the long sought and climaxing achievement in lighting, namely: low intensity, eye comforting, non-dazzling initial light source.

We have a new factor in high power lighting, a light that is easier on the eyes and a large source area as contrasted with a high intensity filament source. The human eye at a reasonable distance pleasantly accepts the lower intensity unshaded source, where it is blinded by the bare high intensity source.

The super candle power gas lamp, when located at a shade height from 13 to 15 feet above ground level, not only brightly floods a building with a soft light but also spreads its rays over a large area, attracting attention several blocks away.

Bargain Rate Plan

Harry I. Miller, Oshkosh, Rate Engineer, Wisconsin Public Service Corporation:

Bargain gas rates, similar to those adopted by electric companies, offer opportunities for the public to increase their use of gas service at less cost than formerly and give companies new power to retain their present business and to develop new uses for gas.

The bargain rate alone will not accomplish its objectives unless accompanied by intensive sales efforts, extra advertising and educational effort.

There are so far as we know, only five gas companies in the United States outside of our own here in Wisconsin which have adopted a bargain rate plan for gas service. These plans vary from "free gas" plans, "profit sharing" plans, "service at cost" plans to our bargain rate plan, which provides a nominal charge for the increased use of service.

A bargain rate plan is inherently a temporary means to an end. Without requiring a large immediate reduction in revenue, it permits customers to transfer from an existing rate schedule to a lower one if these customers will increase their use of service. The duration of such a plan of course is dependent upon the time it takes to transfer the majority of customers to the lower level of rates. This depends, to a large extent, upon the sales effort which the company puts forth and the receptivity of the customers to a fuller use of service.

Our gas plan consists of the customary three parts—the present standard rates, the low cost or objective rate, and a low rate for increased use by means of which customers may build up their usage at a nominal charge,—until they have reached the low cost rate.

We have different levels of rates for different communities, but let me take the Sheboygan rates as an illustration. The present standard rate is $1.35 per M for the first 5,000 cubic feet per month. That takes in 91% of the residential business, but anyway the next 5,000 cubic feet can be purchased at only $1.20 per M—a whole 15¢ per M less than the first 5 M. Not much promotional in that you say? True, we admit it! Now, for our objective rate, we have adopted the following:

Cu.ft. per Month		
First 600	for $1.00 net	
Next 2,400	for 1.10 net	per M
Next 50,000	for .80 net	per M
Excess	.75 net	per M

That looks much better from a promotional standpoint. Nowhere is there an indication of any gas costing more than $1.10 (instead of $1.35) per M. And, after a use of 3,000 cubic feet, an 80¢ rate is available.

Now, to get from the present standard rate to the new low cost rate, we charge 8¢ per hundred cubic feet for each hundred cubic feet used over and above that used during the base month,—until the low cost rate is reached.

Under the plan, then, a customer remains on the old standard rate unless

his use of service is greater than it was during the base month which in our case, is the corresponding month of the year ended June 30, 1935. We chose this base period because it coincided with the base year of our electric plan and thus results in less cost of administration and less confusion in billing. Whenever the customer's use of service is greater than it was during the base month, such additional use is billed at 8¢ per hundred cubic feet—the only limitation being that the total bill for service shall be not less than if the entire consumption were billed on the objective rate.

Automatically, any customer getting a bill for an amount equal to the charge for 10 M cu.ft. on the low cost rate is billed on that rate subject to that bill as a minimum. In addition to this, any customer who uses gas for self-action water heating (or house heating) is billed on this low cost rate. In this latter respect, our gas plan has advantages that the electric does not have. By installing a self-action water heater, the customer immediately qualifies under the low cost rate. In another respect, the gas rates have an advantage over the electric rates. Whereas under the electric plan a customer is able to buy a limited amount of 2¢ energy instead of paying 2½ or 3¢ for it, the margin is much greater under the gas plan where an 80¢ rate replaces one on the order of $1.40 per M and the limit of additional use at the bargain rate is greater.

Since our plan has been in effect only two months, it is rather difficult to point to tangible results. In some of our communities, however, where we have electric competition we have gotten more favorable reaction. It has been pointed out that we have not received so many comments to the effect that gas rates are high. On the contrary, remarks have been made that our rates now look favorable. In a number of cases we have been able to retain customers who have indicated a desire to install electric service.

State Legislation

A. J. Whitcomb, attorney for The Milwaukee Electric Railway & Light Company:

Five bills directly affecting gas or electric utilities were enacted into law: One provides a direct tax of 3% on gas and heating energy; the second provides for punishment and fine upon any person who steals gas, electricity or water; the third imposes punishment or fine upon anyone who hinders a utility company representative from entering buildings to inspect meters or check the use of gas, electricity or water; the fourth authorizes the Public Service Commission to enforce regulations governing the safe construction of overhead utility lines; the fifth provides for the registration of architects and civil engineers so as to embrace all branches of engineers under classification of "professional engineer." The operating companies are not affected by this enactment since engineers employed by regulated utilities are exempted from the registration requirement. If engineers are to be qualified as expert witnesses in court or before commissions they must be registered.

Distribution Design

Theron Brown, Madison Gas & Electric Company:

Utilization of gas and electric service is being radically changed by the intensified sales efforts that are accompanying state-wide bargain rate reductions. These changes in the use of gas and electricity by our customers are creating new technical problems in the design of distribution systems, particularly pertaining to those details and parts closer to our customers' premises. This requires new studies by engineers. Already manufacturers and utility engineers are developing new production and distribution equipment designed to meet the changing characteristics of our customers' new requirements. Engineers of each company must apply themselves to each individual component part of the system, starting with the production plant and considering those individual component parts successively to the point on the customer's premises where the service is used.

Specific Gravity of Gas

Professor O. L. Kowalke, chairman of the department of Chemical Engineering, University of Wisconsin, in describing the measurement of the specific gravity of gas dealt with methods of weighing depending upon velocity of flow and utilization of the drag or viscosity of gas.

He said that the measurement of the specific gravity of gas is of much greater significance than formerly due to the number of changes in gas utilization, the character of gas supplied to gas users, the new design of burners and because modern gas appliances are equipped with devices for automatic regulation, which for effective precaution, require gases of uniform specific gravity.

"Today the gas regularly furnished the consumers in some cities is a mixture from two or more sources; peak loads, furthermore, are carried quite universally by mixtures of gases of different processes of manufacture. That the consumer shall get the best service in these complex situations, it has been stated repeatedly by experts on the manufacture and the utilization of mixed gases that the following items are of importance: (a) specific gravity, (b) chemical composition, (c) heating value, and (d) gas pressure at the service.

"It has also been shown by investigators that for proper burner operation the changes in specific gravity should not exceed a 10 per cent variation up and down from the gas for which the burner adjustment has been made."

Bituminous Coal for Generator Fuel

Leon J. Willien, Chicago, operating gas engineer, Byllesby Engineering & Management Corp., talking on the use of bituminous coal for generator fuel, said in effect:

While the use of bituminous coal as generator fuel is complete gasification of coal, there is a loss in the amount of coal gas recovered from that theoretically available.

Mr. Willien reviewed the development of the process for the use of bituminous coal for a generator fuel; the difficulties encountered and how they may be eliminated. He restated the code of simple operating rules drawn up by the American Gas Assn. Bituminous Coal Committee of 1926 as an operating guide.

From the data available on coal carbonization and on water gas generation he has made a study of the engineering and economic possibilities of recovering all of the coal gas available in such generator fuel. To do this he outlined some possible modifications of the conventional water gas process. One important conclusion from these studies is that the amount of heat available in the gases which may be utilized for carbonization in such a water gas process is insufficient to carbonize the coal with the theoretical maximum coal gas recovery.

Who's A Sissy?

NOT many years ago the man of the family might have considered it beneath his dignity to grace the kitchen in the capacity of cook for fear of being called a sissy, but today the situation is different, Miss Albertine Berry, home economics director of the Lone Star System, pointed out in an address before the annual foreman-manager conference of the Lone Star Gas Company in Dallas, Texas, Oct. 25. In her discussion of "Are Men Going Sissy?" Miss Berry showed that cooking is becoming a hobby with more and more men, while others consider it a smart business.

"A man is not considered a sissy if he has the ability to go into the kitchen and prepare a special dish or meal," Miss Berry said. "Such ability is an accomplishment. Many men have commercialized on their ability to cook and have made money from it.

"Culinary knowledge is particularly useful to men in the gas business. Correct cooking methods make a better meal; a better meal makes a satisfied customer; pleased customers make more sales. Thus it is necessary for gas people to know whether a roast should be covered or uncovered, the tricks of broiling a steak, the correct temperature for baking a cake, etc. They should have this information handy in order to pass it to prospective purchasers of gas appliances for cooking."

McCarter Medals Awarded for Life Saving

RECENT months have seen more names added to the long list making up the gas industry's honor roll for heroic and distinguished service in saving human life. Individuals who have performed conspicuous personal service, in addition to receiving local honors, have been given national recognition through the award of McCarter medals, bars and certificates.

Donated by Thomas N. McCarter, president of the Public Service Electric and Gas Company, Newark, N. J., the McCarter medal is awarded by the American Gas Association for the successful application of the Schafer prone pressure method of resuscitation.

Following is an account of recent presentations:

William F. DeMoss, employee of the Harrisburg Gas Company, receiving a McCarter medal and certificate from Daniel N. Casey, secretary of the Harrisburg Chamber of Commerce

The Harrisburg Gas Company

At the regular monthly meeting of the Employees Association of The Harrisburg Gas Company, Harrisburg, Pa., held Friday evening, October 11, with more than two hundred present, William F. DeMoss, meter reader, was presented with a McCarter medal and certificate. The medal was appropriately presented by Daniel N. Casey, secretary of the Harrisburg Chamber of Commerce.

Mr. DeMoss was cited for an act performed on the evening of March 21, 1935. While visiting with friends, his attention was called to a man in a neighboring house apparently lifeless from the effects of gas asphyxiation. He immediately assisted in carrying the man to the open air and applied the Schafer prone pressure method of resuscitation.

Upon the arrival of the ambulance to take the person to the hospital, the Doctor made this statement: "Had it not been for the prompt and scientific artificial respiration rendered by Mr. DeMoss, the patient would undoubtedly have died before the arrival of the ambulance. Mr. DeMoss deserves a great deal of credit for his skill in rendering artificial respiration."

Presentation of a McCarter medal and certificate to Jack Alexander, employee of the Gastonia and Suburban Gas Company. In the picture are, left to right: H. W. Gee, division manager, S. F. Kimball, C. W. Capps, manager, Mr. Alexander, T. A. Wilson, commissioner, N. C. Industrial Commission, and G. McLaughen, fire chief

The Raleigh Gas Company

For their rescue of C. H. Cleveland when he was overcome by gas in a regulator pit last February, Ben G. Cates and Harold C. Allen, employees of the Raleigh Gas Company, Raleigh, N. C., were presented with a McCarter medal and certificate, respectively, at an impressive ceremony, October 24. Mr. Cleveland, a contractor, was removed from the regulator pit by Mr. Cates, who immediately began application of the prone pressure method of resuscitation, assisted by Mr. Allen, which was successful in saving Cleveland's life.

Associate Commissioner T. A. Wilson presented the medal and certificate to the two men on behalf of the American Gas Association and the Raleigh Gas Company. The awards were the first to be made in North Carolina.

Gastonia and Suburban Gas Company

Jack Alexander, pipe fitter's helper with the Gastonia and Suburban Gas Company, Gastonia, N. C., and C. W. Capps, manager of the company, were signally honored November 1, when the former was presented with a McCarter medal and certificate and the latter with a certificate for saving the life of a man accidentally asphyxiated by gas.

The awards were made at a safety meeting held in the offices of the gas company, attended by local citizens interested in the practice of resuscitation. H. W. Gee, of Raleigh, divisional man-

ager of all North Carolina properties of the Consolidated Gas and Electric Company, of which the Gastonia concern is a part, presided at the meeting and spoke briefly on practical safety, especially as applied to the home.

Public Service Electric and Gas Company

Two employees of the Public Service Electric and Gas Company, Newark, N. J., Conrad Schuck and George Layer were presented with McCarter medals, October 29, for the successful application of the prone pressure method of resuscitation of persons overcome by gas.

The presentations were made at North Park Street gas shop, East Orange, by John M. Orts, director of safety education. A certificate of assistance for aiding in one of the resuscitations was awarded Herbert Thielemann.

Mr. Schuck is superintendent of gas distribution, East Orange; Mr. Layer is general foreman, North Park Street shop, and Mr. Thielemann is also employed at North Park Street.

The resuscitation for which Mr. Schuck was honored took place on February 8, of this year. Mr. Layer received his medal for a resuscitation which occurred in September of last year. Mr. Thielemann assisted in this resuscitation.

Herbert H. Ferris, general manager; Frederick A. Lydecker, general superintendent of distribution, and James N. Killgore, Essex Division engineer of distribution, Gas Department, attended the presentation meeting and commended the men.

A. F. Hockenbeamer Dies

AUGUST F. HOCKENBEAMER, president of the Pacific Gas and Electric Company, San Francisco, since 1927 and one of the nation's outstanding utilities executives, died Nov. 11 of a heart attack at his home in Berkeley. He was sixty-four years old.

Mr. Hockenbeamer was born in Logansport, Ind., and attended public school there until he was sixteen, when he quit and started doing odd jobs about town. Before leaving school, however, he had taken a course in stenography, and he soon left home to apply for a job as a stenographer with the Pennsylvania Railroad. No such position was open at the time, so he became a janitor for the line.

While at this work he met L. F. Loree, now president of the Delaware & Hudson Railroad, then a division engineer of the Pennsylvania. Mr. Loree agreed to give Mr. Hockenbeamer some part-time stenographic work, and the janitor soon became Mr. Loree's private stenographer. He remained with the line until he was thirty-two years old, when he joined N. W. Halsey & Co., New York investment banking firm.

The banking firm was a large stockholder in the Pacific Gas and Electric Company, and in 1907, when Mr. Hockenbeamer had been with the company for four years, he was sent west to inspect the utility concern's properties. He so impressed the officials of the utility company that he was requested to remain with the firm for a year as comptroller.

He accepted the invitation, and at the end of the year he was made vice-president and treasurer. In June, 1914, Mr. Hockenbeamer conceived the idea of selling the customers preferred and common stock in the company. The company had between 400,000 and 500,000 customers at the time, all of whom could be reached within a few days, and the idea was a success. It has since been widely adopted by utility companies. He succeeded W. A. Creed as president of the company in August, 1927.

Mr. Hockenbeamer was a trustee of the Edison Electric Institute and a member of the American Gas Association and the Association of Edison Illuminating Companies.

Black Heads P. G. & E.

Directors of the Pacific Gas and Electric Company, San Francisco, at a meeting November 20, elected James B. Black as president to fill the vacancy created by the sudden death of A. F. Hockenbeamer. Mr. Black has resigned as vice-president of North American Company and as vice-president and director of Western Power Corporation to assume his new duties on the Pacific Coast.

Cooperative Gas Exhibit at National Metal Show

Lounge of gas furnace section

FOLLOWING the custom of previous years the American Gas Association, in cooperation with six mid-west gas companies and fourteen companies manufacturing industrial gas equipment, conducted a working display of industrial gas apparatus at the National Metals Exposition, held in the International Amphitheatre, Union Stock Yards, Chicago. The Exposition extended from September 30 to October 4.

A space covering an area of 5,300 square feet, known as the Gas Furnace Section, occupied a prominent location in the large amphitheatre which was filled with exhibits of leading firms of the country, who manufacture and fabricate ferrous and non-ferrous metals. The exposition was attended by over 36,000 persons. The visitors, who were obviously men in responsible positions with firms comprising the metal industry, showed a keen interest in the Gas Furnace Section.

Following are the gas companies which cooperated with the American Gas Association in this exposition: Milwaukee Gas Light Company, North Shore Gas Company, Northern Indiana Public Service Co., Public Service Co. of Northern Ill., Western United Gas & Electric Co., and The Peoples Gas Light & Coke Co.

A list of industrial gas equipment manufacturers who exhibited and demonstrated apparatus are as follows: American Gas Furnace Co., Burdett Manufacturing Co., Continental Industrial Engineers, Inc., Eclipse Fuel Engineering Co., Ensign-Reynolds, Inc., Charles A. Hones, Industrial Gas Engineering Co., C. M. Kemp Mfg. Co., Lydon Brothers, Lee B. Mettler Co., Partlow Corp., Selas Company, Sellers Engineering Co., and Surface Combustion Corp.

The exhibit was planned and conducted under the Display & Contact Committee of the Industrial Gas Section of which D. W. Chapman, manager, industrial gas sales, The Peoples Gas Light & Coke Company, was chairman.

Crowds Visit Boston Model Homes

The largest of three Boston all-gas model homes

THE widespread popularity of model homes is forcefully illustrated by the unusual success, during October, of the all-gas model homes sponsored in three towns by the Boston Consolidated Gas Co.

Over forty thousand people visited the houses—the crowds being so great on week-ends that it was found necessary to reduce advertising space.

An interesting phase of the project was that a large percentage of those coming to the model houses were primarily interested in seeing the automatic gas appliances, especially gas heating and air conditioning.

The three houses are equipped to use gas automatically for cooking, refrigeration, water heating, house heating and air conditioning. They were constructed by a local realtor and decorated and furnished by a large Boston department store.

The company cooperated in equipping and advertising the homes. The real estate sections in four Boston metropolitan papers were used exclusively, with large advertisements on Sundays and smaller insertions during the week. Much free publicity was secured.

D. H. Levan Heads Lowell Co.

D. H. Levan

DANIEL H. LEVAN has been transferred from Jacksonville, Florida, to the Lowell Gas Light Company, Lowell, Mass., where he has been appointed president and general manager. At the same time Harry K. Wrench was transferred from the Lowell Gas Light Company to take Mr. Levan's former position of vice-president and general manager of the Jacksonville Gas Co.

Mr. Levan was graduated from Lehigh University in 1913 with a degree of Engineer of Mines. He has been in the gas industry for many years with The United Gas Improvement Company, having held positions at Philadelphia, Lexington, Omaha, Sioux City, Sioux Falls, Savannah, Jacksonville and St. Augustine.

Mr. Wrench is a graduate of Michigan State College and has been connected with gas properties during his entire business career.

Columbia Offers Gas Course

A HOME study course on Manufactured Gas, written and conducted by Prof. Jerome J. Morgan, was first offered by Columbia University in October, 1925. The course was designed to meet a demand which arose for instruction in Gas Engineering by correspondence following the discontinuance of the Trustees Gas Educational Course, conducted for many years by A. E. Forstall.

The original Columbia course consisted of 24 lessons, covering two year's study of the production, distribution and utilization of manufactured gas and some of the business aspects of the gas industry. Judging from the enrollment, which up to January 1, 1933, numbered more than 1,600, with some 600 men completing the work, this course met a real need in the industry.

The course has recently been thoroughly revised. In order to be more flexible in meeting the demands caused by changes in the gas industry, it is now offered as a course in American gas practice in two parts, either of which may be taken separately.

Part I consists of 12 lessons, or one year's work, on Production of Manufactured Gas. It is based upon Volume I of American Gas Practice by Professor Morgan. The fee which includes instruction, text and syllabus is $45.

Part II is based on Volume II of American Gas Practice by Professor Morgan. It consists of 12 lessons on Distribution and Utilization of City Gas, and is equally applicable to distribution and utilization of natural gas, manufactured gas, or any mixture of gases. The fee for Part II is $45 including instruction, text and syllabus.

If enrollment in both courses is made at the same time, the fee to members of the American Gas Association or to employees of company members is $60 for both courses payable in advance. Full information on the purpose, content and method of presentation in these courses will be gladly furnished by Kurwin R. Boyes, secretary, American Gas Association, 420 Lexington Avenue, New York City or Prof. J. J. Morgan, Home Study Department, Columbia University, 15 Amsterdam Avenue, New York City.

Natural Gas Men to Meet in Dallas

THE Natural Gas Department of the American Gas Association is rapidly completing plans for its four-day convention in Dallas, Texas, May 5-8. Headquarters for the meeting will be at the Adolphus and Baker hotels.

The tentative outline of the program calls for general sessions the afternoon of May 5 and the mornings of May 6, 7 and 8. The afternoons, other than the first day will be devoted to parallel sessions covering specific problems of transmission, production, industrial, sales and utilization.

Outside attractions include the opening of the Oil Show in Tulsa the week prior to the convention and the Texas Centennial Exposition. Delegates will have the opportunity to attend both the Oil Show and the natural gas meeting. While the Centennial Exposition, the southwest's first World's Fair does not officially open until June '6, assurance has been given that all construction will have been finished and the Centennial practically ready to open when the natural gas men convene, thus affording an advance view of the exposition.

In view of the comprehensive program and added attractions, the meeting is expected to draw a record gathering of natural gas men.

NATURAL GAS DEPARTMENT

WILLIAM MOELLER, Jr., Chairman A. E. HIGGINS, Secretary GEORGE E. WELKER, Vice-Chairman

Monograph 6 Reports on Flow of Natural Gas through High-Pressure Lines

RESEARCH on the flow of natural gas through high-pressure transmission lines conducted over a period of several years by the United States Bureau of Mines, Department of the Interior, with cooperative assistance from the Natural Gas Department of the American Gas Association, is the subject of Bureau of Mines Monograph 6 which has just been issued.

In the course of the study 79 flow tests were made on 29 commercial pipe lines, totaling 757 miles of pipe in the principal natural gas areas of the country with diameters ranging from 6 to 22 inches and operating pressures from 30 to 600 pounds per square inch. The larger diameter lines that were free from condensates and other foreign materials and were operating under steady flow conditions delivered gas at metered rates which agreed more closely with rates calculated from the Weymouth pipe line flow formula than with those calculated from any of the other formulas studied. In almost every test, under these conditions, the volume calculated from the Weymouth formula was within a few per cent of the metered delivery.

Recognizing the need for reliable data pertaining to flow of gas suitable for commercial design and operation of high-pressure transmission systems, the Bureau of Mines and the Natural Gas Department of the American Gas Association undertook this cooperative investigation, which primarily was an engineering study, with the view of gathering numerous data from carefully conducted tests on gas flow through representative pipe lines under many conditions of operation. These data, with all other available information, have been analyzed carefully to obtain practical information for the use of operators in designing pipe lines and determining the effects of different operating conditions on pipe line capacities.

During the review of existing data pertaining to the flow of natural gas through pipe lines, it was found that the several pipe line flow formulas developed by different investigators, which differ mainly in the methods of considering the coefficient of friction, gave widely varying results when applied to problems of pipe line design. Comparisons were made of the relationship between the coefficients of friction and the internal diameter of the pipe as expressed by the pipe line flow formulas and as determined from the tests made during the investigation. The coefficient of friction tends to decrease slightly with increasing diameter of pipe. The curve based on the Weymouth formula for the relationship between the coefficient of friction and diameter of the pipe when applied to the lines larger than 6 inches in diameter agreed closely with the average of the experimental data and satisfied the test data as well as any curve that could be drawn through the plotted points.

Further analyses of the data from the flow tests on commercial lines, together with the results of laboratory investigations and tests on a small experimental pipe line, indicate small variations in the coefficient of friction, depending upon the velocity, density, and viscosity of the gas, and the diameter of the pipe, a mathematical analysis of the variations observed in the calculated coefficient of friction was made on the basis that the coefficient of friction for the flow of any fluid through a circular pipe is some function of the Reynolds criterion—the pipe diameter multiplied by the velocity and density of the fluid divided by the viscosity of the fluid.

Text Arrangement

The authors of this joint report, T. W. Johnson and W. B. Berwald of the Petroleum and Natural Gas Division, Bureau of Mines, have arranged their text, comprising 120 printed pages and 25 figures, in an understandable and accessible form. First there is a listing of pipe line flow formulas used by different investigators with citations to original sources; second, the authors discuss the flow tests they made on commercial and experimental pipe lines, including methods of testing and of analyzing flow data; and third, there is a discussion of the application of flow data and equations to commercial pipe line transportation problems.

The main text of the monograph is followed by appendixes giving detailed mathematical development of formulas, including derivation of general formulas for flow of natural gas through pipe lines, the Reynolds criterion of the coefficient of friction, formulas having the coefficient of friction expressed as a function of the Reynolds criterion, and derivation of special formulas for designing pipe line systems consisting of parallel lines. There is also an appendix of tables and formulas, and one describing the pipe lines that were tested. Monograph 6 presents in one volume all of the important material pertaining to the subject of pipe line flow developed in accordance with the original intent of the cooperative project.

Engineering considerations that are discussed in various sections of the monograph include the effect on delivery capacity of liquids and rust scale in pipe lines, sources and removal of liquids, variations in ground temperatures, design and location of drips, corrosion of lines, stored gas in pipe line systems, effect of differences in elevation at inlet and outlet, and types of construction and equipment. The report also discusses studies that were made of the physical and chemical properties of natural gas that influence flow through pipe lines, including determination of the chemical compositions, deviations from Boyle's law, and the absolute viscosities of the natural gases in the various pipe lines tested.

The monograph points out that the value of applying many minor corrections in pipe line flow calculations, such as those due to small differences in elevation at the inlet and outlet of the line, reduced diameter fittings, bends, right-angle turns, metering stations, drips, type of joints, and lengths of pipe between joints, deviations of natural gas from Boyle's law, and variations in the viscosity of natural gas, often is greatly diminished because of conditions pertaining to individual lines, such as unsteady rates of flow, storage or drainage of gas, the presence of condensates, rust, and foreign material in the line, and the variations in roughness of the interior walls of different lines. The effect of such conditions often is many times greater than the sum of all of the measurable corrections and, for practical purposes of design, minor corrections may be neglected in the flow formulas.

The American Gas Association, under the cooperative agreement with the Bureau of Mines, bore the cost of printing Monograph 6, "Flow of Natural Gas Through High-Pressure Transmission Lines," a joint report by T. W. Johnson and W. B. Berwald of the Bureau's staff. Copies are on sale by the American Gas Association, 420 Lexington Avenue, New York City, price $1.00.

Building New Pipe Line

A PIPE line 45 miles long, 22-inch diameter, from Milpitas to San Francisco, being built by Pacific Gas and Electric Company to reinforce its gas supply to San Francisco, is expected to go into service soon after December 1.

Lone Star Company Tries Innovation in Laying New Line

By E. F. SCHMIDT

General Superintendent, Lone Star Gas Company, Dallas, Texas

WHEN a major river crossing is to be made with a large transmission line, many factors must be considered in arriving at a decision of the type and character of crossing to be used, in order to insure a safe crossing, one that can be depended upon to give the same reliable and continuous service as any other part of the line, notwithstanding the additional difficulties that must be overcome compared to ordinary cross-country construction.

It is sometimes possible to change the location of the pipe line to a minor extent in order to cross a stream at a better location than would be had if the line were laid as a straight line between two points. When a change of this kind is made, it is necessary to balance the increased cost of the added length of the line against the saving which will occur in construction costs due to the improved location.

A surveying crew should have considerable experience, in addition to surveying ability, to locate a pipe line so that the construction cost will be a minimum and so that unusual obstacles can be avoided if possible. The chief of such a party must be able to inspect a river and select a number of possible locations for a crossing which can then be examined by the engineering department for the selection of the best crossing.

The character of the bed of the stream will help to determine whether an under-river crossing or a bridge would be the most economical. Where quicksand and unstable river bed might be encountered, an overhead crossing or bridge would undoubtedly be the most economical over a period of time when taking into consideration probable maintenance and replacement of an under-river crossing.

Trinity Crossed Two Times

The Trinity River which is crossed twice by our new 20-inch line in extending from the Long Lake and Cayuga fields to Dallas is normally a river with steep banks and clay bed; however, during flood stage the river may be over a mile wide in places. This type of stream with good foundation for a pipe line in the bed of the stream would not warrant the building of a separate bridge for a pipe line crossing.

In making a crossing of a stream of this nature for a large line the usual practice has been to use manifolded lines. A header would be built on either side of the river well up in the bank and a number of smaller lines extended from header to header across the bed of the stream. The banks of the Trinity are reasonably permanent and a good foundation could be had in the bed of the stream. We, therefore, decided to extend the 20-inch line in the case of these two crossings without a header arrangement, allowing the 20-inch to run continuously under the bed of the river. The banks on either side were excavated to a gradual slope from the bed of the stream to the top of the bank, well back from the original bank and a channel was dug through the bed of the stream to permit the pipe line to have about four feet covering from the top of the line to the original bed of the stream. A profile of the finished ditch was made for the entire length of the river crossing from the top of the bank on one side through the excavated bed of the stream to the top of the bank on the opposite side. The 20-inch pipe was then shaped to the profile by making the bends at proper locations and the pipe for the entire river crossing was suspended over the stream above the water in such a position that it could be properly coated.

Picture taken shortly before the Lone Star Gas Company's new 20-inch pipe line was lowered into a channel in the Trinity River near Trinidad in Henderson County

Special Clamps Used

Special clamps were attached at each weld which provided weight to help keep the line from floating and in addition provided a tight joint in case a fracture occurred in the weld. These clamps are constructed so that even though a weld breaks the pipe will not pull out of the clamp, thereby preventing loss of gas. In order to counteract the buoyant effect of the 20-inch pipe, it was necessary to provide additional weight. This was accomplished by placing around the 20-inch pipe a piece of pipe some four inches in diameter larger than the 20-inch pipe and approximately two and one-half feet long and filling the annular space with molten lead. This provided about 1,500 pounds additional weight between each river clamp.

While the pipe was suspended over the main channel, it was thoroughly cleaned by men operating from a raft. Then a coating was applied, consisting of a petroleum grease; a fabric wrapper tightly wrapped around the pipe, a second and heavier coating of petroleum grease applied, and a final wrapper of asbestos impregnated with the grease material. This was all very carefully applied and it has been our experience that this type of coating gives very good protection where the pipe is always wet, which, of course, would prevail in an under-river crossing.

After the coating was completed, the pipe was lowered into the prepared trench and it fitted almost perfectly to the contour of the ditch. It was then only necessary to back-fill the excavations made along the bank as the trench in the bed of the stream would soon fill up from silt carried by the stream itself.

This type of river crossing is somewhat of an innovation from the ordinary river crossing, but we feel that it will be entirely satisfactory, giving a minimum amount of trouble and maintenance.

Advertising Federation Honors W. C. Grant

W. C. Grant

WILL GRANT, advertising director of Lone Star Gas System, Dallas, Tex., was elected governor of the Tenth District, Advertising Federation of America, at the district's annual convention held in Oklahoma City, Nov. 1-2. The Tenth District comprises organized advertising clubs in the southwest. Dallas was selected as site for the 1936 convention.

Mr. Grant is past president of the Dallas Advertising League, the oldest luncheon club in the city, and has been active in advertising and newspaper circles in the southwest for a decade. He came to Texas in 1923 to take charge of the Austin bureau of the Associated Press. Later he was director of the Texas Public Service Information Bureau and in 1929 joined the Lone Star Gas Company. He organized the advertising and public relations department of the company and has expanded the department with the growth of the company until it is one of the largest utility company advertising departments in the southwest.

Upon his election as Tenth District governor he made a plea for adherence to the advertising code of ethics and the elimination of unethical practices and racketeering from advertising and business.

Columbia Announces Major Executive Changes

THREE major executive changes in two operating groups have been announced by the Columbia Gas & Electric Corporation. George W. Ratcliffe, president of the Pittsburgh, Pa., group of companies and assistant treasurer of the corporation, will retire December 1 and will be succeeded by Charles E. Bennett, president of the Binghampton, New York, group. Irving K. Peck, assistant vice-president of the Boston Consolidated Gas Company, will join the Columbia organization as Mr. Bennett's successor.

G. W. Ratcliffe

Mr. Ratcliffe has been active in the natural gas industry for 38 years. Born in Buffalo, N. Y., he entered the oil business and later became associated with the utility which is now the Iroquois Gas Co. of that city. His first position in Pittsburgh was with the Peoples Natural Gas Co., and in 1910 he became auditor for the Manufacturers Light and Heat Company. He was treasurer of the Ohio Fuel Corp. of which Manufacturers became a part.

When Ohio Fuel was merged with Columbia, Mr. Ratcliffe was made president of the Pittsburgh group, which includes the following: Cumberland & Allegheny Gas Co., Fayette County Gas Co., Gettysburg Gas Corporation, Greensboro Gas Company, Manufacturers Gas Company, Manufacturers Light and Heat Company, Natural Gas Company of West Virginia, and Pennsylvania Fuel Supply Company. He has been active in the affairs of various gas and oil associations, and in 1932-33 was chairman of the Natural Gas Department of the American Gas Association.

C. E. Bennett

Mr. Bennett is chairman of the A. G. A. Commercial Section for 1935-36. He graduated from the University of Wisconsin in 1912 with a B.S. degree in mechanical engineering. For the next three years he was fire prevention engineer for the State of Wisconsin. In 1915 he joined the Madison Gas and Electric Company, as superintendent of the gas plant, and three years later was made secretary and treasurer.

In 1920 Mr. Bennett joined the Binghamton Gas Works as vice-president and general manager. Ten years later he held the same position under the Columbia Engineering and Management Corp. in addition to being appointed vice-president and general manager of the following: Home Gas Company, Keystone Gas Company, Eastern Pipe Line Company, Reserve Oil Corporation, and Consumers Natural Gas Company. From 1931 to date Mr. Bennett has been president and general manager of the entire group, with the exception of Reserve Oil and Consumers Natural, which have discontinued operations.

I. K. Peck

Mr. Peck has resigned as assistant vice-president in charge of the commercial departments of Boston Consolidated to take his new position. Born in Braidwood, Ill., a small coal-mining town, in 1895, he was initiated into the gas business at the age of 13 during the construction of the first American Koppers-type coke oven plant for the United States Steel Corporation at Joliet. After graduating from high school in 1913, he was employed in various operating capacities at that plant, and in 1915 entered the University of Illinois where he studied mining engineering, specializing in coal, oil and natural gas geology.

In 1917 he was employed as a coke oven operator for the Inland Steel Company at Indiana Harbor, Ind. Two years later Mr. Peck entered Massachusetts Institute of Technology and in 1921 graduated in chemical engineering, specializing in gas and fuel engineering. He then became an operating engineer for The Peoples Gas Light and Coke Company, Chicago, and in 1925 became associated with the organizing and development of the Midland United Company as manager of gas and water operations. He is a member of the A. G. A. Advisory Council, and a past chairman of the Technical Section.

Natural Gas Wrinkle Contest Stimulates New Ideas

THE new Wrinkle Contest of the Natural Gas Department, American Gas Association, is in full swing. A new year in this stimulating enterprise opened when awards for the past year were announced in October.

After more than five years of wrinkles contests gas company executives everywhere are enthusiastic about this method of encouraging inventions among their employees. The purpose of the contest is to stimulate interest in labor-saving devices and new ideas in solving common problems.

The financial rewards come from a permanent revolving fund of $250 per year. The awards are divided into five classifications: production, transmission, distribution, office and safety, and three prizes are given in each classification. First prize in each division draws $25, second $15 and third $10.

Many improvements in the industry have resulted from the work done by men whose interest was stimulated by these rewards. Some men have worked for years on inventions which ultimately won prizes and thus performed a commendable service for their companies.

Some companies have organized their own wrinkle contests and have made awards to their own men in addition to those presented by the Association. Where this has been undertaken, it has greatly increased the interest in this project.

A total of 88 wrinkles were submitted for the last contest and 15 awards were made. However, 67 of the 88 came from three companies: Peoples Natural Gas Company, the Ohio Fuel Gas Company, and the Lone Star Gas Company. The Peoples Natural Gas Company took four awards, Ohio Fuel Gas 3 and Lone Star Gas 3. The other awards, one each, went to Columbia Gas Company, Monongahela-West Penn Public Service Company, Kansas City Gas Company, Union Gas Company, and Panhandle Eastern Pipe Line Company. Other companies and individuals submitting wrinkles were: Equitable Gas Company, Indiana Gas Transmission Corporation, Arkansas-Louisiana Pipe Line Company, F. Morris Sloan, George J. Hill, Carnegie Natural Gas Company, Southwestern Gas Utilities Company.

Due to the difficulty in some cases of determining in which division a specific wrinkle belongs, the awards committee this year has stipulated that all wrinkles submitted must be classified by the author in one of the five divisions.

Company executives are urged to bring this contest to the attention of everyone in their companies. If anyone has a new idea that will save time, material or effort in the production, transmission or distribution of natural gas, or will effect a short cut or closer check in the office end of the industry or save life or prevent injuries, he should send it to the Wrinkle Committee. The inventor should designate which section it should be charged in, give a short description and if possible a photograph or pen and ink sketch. The invention not only may receive an award but it may be patented and bring the inventor a substantial income.

ACCOUNTING SECTION

F. L. GRIFFITH, Chairman H. W. HARTMAN, Secretary E. J. TUCKER, Vice-Chairman

The Use of Work Units in Assigning Meter Reading

By HAROLD S. RAND
Worcester, Mass.

THAT the elements of meter reading can be classified, measured, and the results applied in assigning and compensating for meter reading has been demonstrated in a study made by the Worcester Gas Light Company.

In 1934 the problem of rearranging the reading of 40,642 meters arose. Worcester is a city built on and between five hills with an area of 38.41 square miles. These hills have a definite effect on the meter reading, chiefly because of the strained effort with resultant fatigue. The number of meters per mile of main at the time the study was made was 112. The homes, consisting chiefly of one, two, and three family houses are well spaced and with little exception are not congested. The average number of apartments contained in the 1015 apartment houses in Worcester is 6.7. This is a condition quite different from some of the larger cities in which much larger apartment houses prevail.

It was suspected that the meter route books did not contain a fair day's work. It was known that there were inequalities in the amount of work contained in the various books. To present the solution of this problem and to show the results obtained is the aim of this paper.

Original Formula

Among other methods considered in arriving at a solution to the problem was the method outlined by George B. Webber in an article entitled "Measuring Meter Reading Requirements," which appeared in the April, 1934, *A. G. A. Monthly*. The article presented an analysis of the elements entering into meter reading. From reports submitted by the readers, unit times applicable to each element were determined; viz.

1. OFFICE TIME 35 Minutes
   The time required to obtain and arrange the book in the morning, and to turn in the book and reports at night.
2. TRAVEL TIME Estimated
   The time required to go from the office to the territory to be read, and return at night.
3. STREET DISTANCE Per Mile,15 Minutes
   The time required to walk over the streets in the route. (Scaled on map for total distance)
4. PREMISES ENTERED Per Premise, 1.6 M.
   The time required to walk from the street to the house, obtain admission, go to the meter location, then back to the street.
5. METERS READ Per Meter, .4 Minutes
   The time required to compare meter numbers, read, check, and enter the index, record the subtraction, and compare it with that shown for the previous month.

This basis of analysis seemed sound and quite different from the usual method of compiling meter books which seems to be an anomalous growth based on the opinions and estimates of the reader and supervisor.

Field Study and Revised Formula

It was decided to make a field study of Mr. Webber's formula for two reasons:

1st—To determine the practicability of the formula.

2nd—To eliminate any guesswork or estimating as far as possible in applying the formula.

After the initial field study, the elements presented above were revised for facility in measurement and to reflect mathematical differences found.

The formula then became the following:

1. OFFICE TIME
   The time required to obtain the new book, turn in the old book, make out the necessary reports, etc.
2. TRAVEL
   The time required to go from the office to the territory to be read and return at night.
3. STREET DISTANCE
   The time required to walk over the streets of the route.
4. STREET TO HOUSE
   The time required to walk from the sidewalk to the point of entrance and from the point of entrance back to the sidewalk.
5. PREMISES ENTERED
   The time required to obtain admission, go to the meter location, compare meter numbers, read, check and enter the indexes, record the subtraction, compare it with the previous month, and return to the point of entrance. The premises were classified as to the number of meters contained in each.

The next step was the establishment of units for the various elements. The Office Time was set at 30 minutes for all books. The Travel Time was estimated for each book depending upon the location of the route and the facilities for reaching it. The number of miles of Street Distance was scaled on the map. The number of feet of Street to House Distance was estimated after study to be 75 feet per premise. In arriving at this last figure, it was necessary to consider that a reader does not always return to the street but walks from back door to back door in a good many cases. Then again the "back" door is not always located at the rear of the house but may be located on either side. In other instances, the customer requires the reader to use the front entrance. These all have their effect on the distance covered and were considered in arriving at the estimate given.

The unknown quantities remaining were the walking speed of the reader and the unit times for Premises Entered. To establish these units, studies were made of 10% of the books covering different sections of the territory. A man, who for reference we will call the "timekeeper," was sent along with the regular meter reader. This timekeeper was equipped with stopwatch and pedometer. He recorded the time of departure from the office and the time of arrival at the job. At this point the pedometer was set and the reader commenced to read the book in the ordinary manner. Upon arrival at the point of entrance to a house, the timekeeper, who did not enter the house because of possible annoyance to the customer, set the stop watch. When the reader returned to that point, the elapsed time and the number of meters in the house were noted, as was also any unusual delay, such as obtaining keys, receiving service requests from the customer, etc. After the last reading in the book had been made, the pedometer reading and the time were recorded.

Summarizing the Results

In summarizing the results of these studies all the unit times on the 1-meter

houses were added together and averaged, all the unit times on the 2-meter houses were added together and averaged, etc.

The following shows the figures obtained:

No. of Meters on Premise	*Time Required*
1	.967 Minutes
2	1.093 "
3	1.183 "
4	1.527 "
5	1.833 "
6	1.900 "
7	1.983 "
8	2.000 "

In the studies made, insufficient figures were accumulated to insure accurate unit times on houses containing more than 8 meters. Therefore, in each instance where an apartment house contained more than 8 meters, a knowledge of the apartment house plus the figures given above were utilized in arriving at a reasonable figure. As mentioned above, the average apartment house contained 6.7 apartments, so that the number of these instances were few.

To arrive at the speed of walking, all that was necessary was to determine the difference in time from the arrival on the job up to the reading of the last premise. From this was deducted the total Premises Entered time and the lunch hour. The answer divided by the number of miles recorded on the pedometer indicated the minutes per mile. The results which have been compared with figures obtained from one of the larger outdoor clubs and found to be about the same are as follows:

Flat walking	30 minutes per mile
Medium hilly	40 minutes per mile
Hilly	50 minutes per mile

These figures might seem liberal, but if the type of walking involved and the fatigue resulting from running up and down stairs is considered, as well as the fact that steps leading from the sidewalk to the house walk are common in Worcester, their reasonableness will be acknowledged.

Application of Results

The utilization of the information then followed. All books were reviewed and the unit times applied.

Route "A" represents a sample of what actually showed up in this study.

All that was then necessary was to add sufficient premises and distance to the book to bring it up to the required number of hours. After all the books covering the area had been treated in this manner the 192 books containing the 40,642 meters had been reduced to 148, an approximately 23% reduction. Check has been kept on the ability of the men to complete the revised books and even during the poor seasonal conditions they were able to complete their books as given.

It is interesting to note that using the formula given in "Measuring Meter Reading Requirements" the total time would have been 322 minutes or 29 minutes less. Books having long distances would take less time to read under the original formula. Books having more premises to read and especially 2 or more meter premises would take less time to read under the revised formula, the difference being accounted for, of course, by the difference in the unit times.

For example:

ROUTE "A" (Medium Hilly Walking)

			Minutes
Office Time			30
Travel Time (Estimated)			60
Street Distance (Scaled)	3 Miles		
plus			
Street to Entrance Distance			
92 Premises × 75 ft. =	1.3 Miles		
Total	4.3 Miles		
	4.3 Miles × 40 Minutes/Mile =		172

Premise Time

No. of Meters on Premise	*No. of Premises*	*Unit Time*	*Total Minutes*
1	86	× .967 =	83
2	5	× 1.093 =	5
3	1	× 1.183 =	1
			89

Total Minutes Required To Read Book 351 or 5.85 hours

ROUTE "B" (Flat Walking)

			Minutes
Office Time			30
Travel Time (Estimated)			40
Street Distance (Scaled)	1¼ Miles		
plus			
Street to Entrance Distance			
138 Premises × 75 ft. =	2 Miles		
Total	3¼ Miles		
	3¼ Miles × 30 Minutes/Mile =		98.

Premise Time

No. of Meters on Premise	*No. of Premises*	*Unit Time*	*Total Minutes*
1	71	× .967 =	69
2	42	× 1.093 =	46
3	24	× 1.183 =	28
5	1	× 1.833 =	2
			145

Total Minutes Required To Read Book 313 or 5.2 hours

Time Required in Original Formula—6.8 Hours

Cautions

In any plan of meter reading work distribution there are several points which should not be overlooked:

1. A meter reader's job does not consist entirely of reading meters. He is the only company representative in a good many cases who interviews the customer, and this point should be kept strongly in mind in rearranging the work. Allowance should be made for those conversations with the customer which promote better relations. Therefore do not crowd the reader so that discourteous treatment of the customer would result. Any figures used should be generous to permit of accomplishment with a reasonable amount of effort.

2. The task should be set with a view to the permanent work a meter reader can do without injury to his health.

3. Reward the reader for additional work accomplished.

In conclusion, meter reading will probably never be measured with the same exactness as shop work, due to the variableness of customer conditions and the need for recognition of customer relations. No effort was made in the studies to consider minute factors. The measurements obtained were sufficient to establish a practical distribution of work, and on this basis the presentation is offered to those having similar problems.

Commends A. G. A. Fire Prevention Aid

IN a letter to the American Gas Association, T. Alfred Fleming, chairman of the International Committee for Fire Prevention Week, expresses his appreciation of the cooperation extended his committee by the Association. He writes: "We appreciate very much your interest in emphasizing, in the October issue of the AMERICAN GAS ASSOCIATION MONTHLY, the subject of Fire Prevention and Protection, as well as the campaign for Fire Prevention Week.

"We are grateful for the wholehearted cooperation given to this campaign by your association and hope that we may all be able to feel that the time and labor was well spent."

COMMERCIAL SECTION

C. E. BENNETT, Chairman — J. W. WEST, Jr., Secretary — F. M. BANKS, Vice-Chairman

Long Term Financing of Appliances

M. E. Skinner

By MERRILL E. SKINNER

Niagara Hudson Power Corp., Buffalo, N. Y.

THE price of a product and the terms upon which it can be purchased bear a very close relationship to the volume of sales which can be realized. As aids to selling, low prices and long terms are surpassed only by hard work. Difficult competition puts a premium on them and so does that peculiar public psychology which develops during periods of business depression. It is only natural, therefore, that after five years of severe business depression with resultant curtailment of income that these two important sales factors should be receiving a great deal of attention. The question of prices is a subject in itself and is not within the scope of this paper which will be confined to a discussion of easy payment terms, their influence on sales and the problems which are raised when extended credit is granted to the purchaser.

Incomes Classified

The Institute of Economics of The Brookings Institution of Washington, D. C., has been engaged for a number of years in economic studies and recently released a book entitled "America's Capacity to Consume." This summarizes several years' study of American income and indicates a number of rather important factors which are vital to sales planning On page 54 is a table classifying the incomes of American families for the year 1929. Table I based upon this reference shows that in that year 21% of all the families in the country had incomes of $1,000 or less:

TABLE I

1929 FAMILY INCOMES, U. S. A.

Annual Income	*Per Cent of Total Families*
$ 1,000 or less	21%
1,500 or less	42%
2,500 or less	71%
5,000 or less	92%
10,000 or less	98%

Source—The Brookings Institution "America's Capacity to Consume."

Paper before Commercial Section, A. G. A. Convention, Chicago, October 16, 1935.

I will leave it to your imagination as to what five years of depressed business conditions and unemployment have done to those figures. With a knowledge, however, of the bare essential requirement of food, clothing and shelter for the average family, it is not necessary to go beyond the 1929 figures in order to satisfy ourselves that there is a substantial percentage of all of the families in the country who have little, if any, spendable margin over and above the bare necessities of life. I was interested to compare the distribution of income as shown by the aforementioned table with the distribution of service bills for a typical gas utility company. A utility renders service to practically all families in the territory it serves and, for that reason, reaches the same cross section except as to its geographical limitations as the table in the Brookings study. Chart I shows the result of superimposing the curve of income as taken from the Brookings table with the curve of annual service bills and it is interesting to note how closely the one curve follows the other. This is not at all unusual as it would be reasonable to assume that purchase of utility service would increase somewhere nearly in proportion to family income. This may not always be true in individual cases, but is certainly true when we work with averages.

Confining our discussion for the moment to averages, we would conclude from the foregoing curve that if we have reached a 10% saturation for a given appliance in a given territory the next incomes to which we would expect to sell would be from $4,500 down, except for replacements.

TABLE II

RELATION BETWEEN APPLIANCE SATURATION AND NEXT INCOME BRACKET TO BE SOLD

Appliance Saturation	*Income of Next Market to be sold*
10%	$4,500 and less
20%	3,000 and less
30%	2,500 and less
50%	1,750 and less
80%	1,000 and less

I believe that there are other factors which also must be considered, among them the public acceptance for the appliance in question; the amount which the appliance adds to the service bill and whether or not the appliance in question displaces some other device. Long terms or so-called "painless purchasing" are indicated, first, when income is low; second, when acceptance is poor; third, when the use of the appliance sharply increases the bill for service.

House Heating Terms

In some classes of equipment the primary problem is to displace some existing piece of equipment now rendering the service which we seek. There is always room for an argument as will be illustrated if we take the case of gas house heating. Invariably when a customer purchases gas for house heating, the total cost of the service exceeds that of the less satisfactory substitutes. It is, in a sense, a luxury in that we can heat by other means if we are willing to put up with the inconvenience and annoyance which go with other means of heating. It, therefore, appeals first to the higher income brackets and in that sense should not require long terms in order to sell it for the people who will buy can frequently write a check for the full purchase price without inconvenience. However, gas for heating has not won the same degree of public acceptance which is back of its competitors and our sales proposition must in some way take this into account.

A third factor to be recognized is the cost of the gas consumed by house heating equipment is frequently, if not invariably, in excess of the cost of the apparatus required to burn it. Finally, except in new houses, some form of heating equipment must be displaced. We, therefore, have four distinct problems to meet in formulating our sales proposition. It seems to me that these factors do not always indicate the necessity for long terms. In many instances some form of rental or trial might more easily overcome the primary sales resistance. When the sales objections have once been overcome by actual experience in the customer's own home it might well be that the class of customers with whom we are dealing could afford to pay cash for the equipment.

I have attempted to analyze briefly the problems which we must face in formulating a sales proposition. In order to have clearly before you the important differences between the various so-called time pay-

ment plans which are so frequently encountered today we may classify them as "rental plans," "rental sales plans" and "time payment plans." To avoid confusion, it is well to understand the difference in these terms as I will use them in the subsequent discussion.

TABLE III

DEFINITION OF SALES OFFERS

"Rental Plan"—Merchandise leased to customer with no provision for transfer of title at any time.

"Rental Sales Plan"—All involve a sales transaction although their terms permit use of word "rental" with accompanying reduction in sales resistance. Usually written so transfer of title is accomplished:

(a) By an option clause which may be exercised by customer at their discretion.

(b) By an automatic clause which becomes binding unless voided by customer within a specified time.

(c) Automatically unless the merchandise is reverted for non-payment of instalments.

"Time Payment Plan"—A true conditional sales lease—purchaser binds himself to perform certain obligations—title is transferred upon full performance of these obligations.

While we speak of the latter as a "conditional" sale it is a binding contract subject to the conditions outlined and is a negotiable instrument which can be discounted through commercial banking channels. On the other hand, rental sales contracts as I have defined them above are not eligible to discount because of the indefiniteness of the agreement.

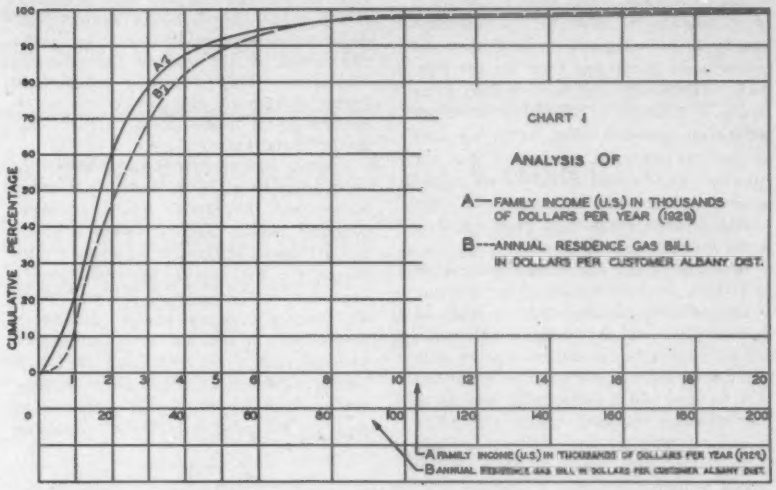
Any one of the foregoing sales instruments imposes upon the seller substantial costs in excess of the cost of doing business on a cash basis. For a detailed discussion of these costs, I would refer you to a paper which was published in the May 1935 bulletin of the Edison Electric Institute entitled "Financing the Customer." Among the principal elements of cost which are illustrated in the more complete tabulation referred to are the following:

TABLE IV

PRINCIPAL EXPENSES OF EXTENDED CREDIT

1. Cost of money.
2. Cost of credit investigation.
3. Bookkeeping, billing and collection expense.
4. Cost of reverts.
5. Cost of supervision.

These elements of expense must either be reflected in an increase in price to the customer over and above the cash resale price, or if this is not done, the transaction resolves itself into merchandising at cut prices. Hence, in considering the results of any specific merchandising operation and in evaluating the volume secured by one company as against the accomplishments of other companies, the factor of price cutting and its consequent reduction in sales resistance must be included.


CUMULATIVE PERCENTAGE
A
B
CHART 1
ANALYSIS OF
A—FAMILY INCOME (U.S.) IN THOUSANDS OF DOLLARS PER YEAR (1929)
B—ANNUAL RESIDENCE GAS BILL IN DOLLARS PER CUSTOMER ALBANY DIST.
A FAMILY INCOME (U.S.) IN THOUSANDS OF DOLLARS PER YEAR (1929)
B ANNUAL RESIDENCE GAS BILL IN DOLLARS PER CUSTOMER ALBANY DIST.

An example may bring home the point: A water heater with a normal cash sale price of $84.50 as determined by customary mark-ups is sold to the customer under a rental-sales agreement, with a rental of $1.00 per month, payments to cease after 72 months. Let us examine just a few of the cost items involved which are not taken care of under this arrangement:

TABLE V

PRICE REDUCTION EFFECTED THROUGH RENTAL SALES OFFER

Retail cash price installed		
Cost F.O.B. factory	$43.20	
Installation	12.50	$84.50
Total rentals		72.00
Difference		$12.50
Cost of Money		
5% per annum on average capital		9.33
$\frac{43.20 \times 1.15 + 12.50}{2} = 31.09$		
72 Monthly bills @ 10¢ each		7.20
Reduction*		$29.03

* Ignores other costs such as—Credit check, Repair expense, Revert expense.

In this case we have favored the time purchaser in the amount of $29.03 without taking into consideration the equally tangible costs of checking credit, of free repair service supplied during the rental period, of supervision necessary for the plan, of the cost of collecting delinquent rentals or the cost of the losses which are incurred as a result of reverts. This example which will be recognized as quite common under present conditions simply serves to illustrate the extent to which it has been necessary for gas companies to go in order to secure business today. I am neither recommending or condemning the practice but simply trying to point out that in the operation as described we have gone to a very considerable sacrifice in order to get the purchaser to accept our service. I do raise the question as to whether there may not be other means of overcoming the sales resistance which do not involve such a direct sacrifice. The fact remains that time payments of one form or another are absolutely essential to sales success today and that brings us to the question of how these sales may be financed.

There are three means by which the investment in appliance and installation may be carried during the term of such time payment plans.

1. The company may have sufficient working capital to carry the volume which is involved.

2. If the working capital is not sufficient, money can be borrowed from the bank with or without the pledge of collateral.

3. The sales instruments, if they are negotiable, may be discounted to a finance company.

Gas companies in the main have had no particular difficulty in financing the sales which they originate, although in recent years with the increasing burden of taxation and the narrowing margin brought about by reduced rates on the one hand and increased expense on the other, many companies have pondered the question. In the gas business, the independent retail dealer has not been nearly so important a factor in the local merchandising situation as has been the case in the electrical industry. This is true because of the narrower line of gas appliances as contrasted with the wide variety of electrical devices, because of the installation question which is usually involved in any gas appliance and, in some cases, because of the technical problems which are involved.

To the extent that dealer relations must be taken into consideration, it is necessary to analyze the effect of the time payment terms which are offered by the gas company on the dealer's opportunity to sell. Ob-

viously, he cannot effect sales unless he is in a position to offer to his customers equally as advantageous terms as they can secure when purchasing from the gas company. Obviously, too, he is seldom in as strong a position to stand the strain of selling on extended terms as in the case of the gas company. I believe that the principal kick which dealers have raised against utility merchandising has been caused by their inability to meet the same terms as the utility is offering.

Whether or not the independent dealer is a factor in the situation at the moment, it is generally admitted that if adequate finance plans can be made available for his use so that he can sell on a parity with the gas company there is little doubt but that he can add a substantial volume to the appliance business which the utility company is able to obtain with consequent increases in gas revenue. Therefore, it would be highly desirable if a financing arrangement could be secured which would permit the dealer to sell in competition with the gas company.

Dealer Financing

To accomplish this result there are two possible solutions to be considered. The first is for the utility company itself to discount the dealer paper written under identical terms as its own sales and to carry the account for the dealers. The other solution is to make available for dealers through some independent financing agency a satisfactory finance service. There are disadvantages to both arrangements.

In the case where the utility undertakes to discount dealer paper they are entering into a field in which they have little experience and which is filled with problems and technicalities that the average utility is not set up to handle. If the plan is workable it is likely to tie up a substantial proportion of the utility working capital or require them to borrow funds to carry on the operation. Such a plan requires the gas company to check the purchaser's credit and to face the unpleasant task of having to originate credit rejections. When the account gets into arrears, it is necessary for the gas company to become the big, bad policeman and to apply unpleasant collection pressure to the customer in order to get the account brought up to date. In the event that it is impossible to effect collection, the company must take recourse either in repossessing the appliance from the consumer or attempting to enforce collection from the retailer. Neither of these alternatives improves customer relations and with the unstable situation among retailers, many companies who have tried this plan have had rather sad experience in trying to effect collections from them.

On the other hand, there are distinct advantages in trying to effect a suitable arrangement with an outside finance company. Generally speaking, the retail dealers are neither as well financed or as responsible as the gas company and, therefore, if the utility adheres to the terms offered dealers they are penalized for the dealer risk which is involved to the financing institution. This is usually reflected in higher charges for the service and in requirements for higher down payments and shorter maturities.

I would like to differentiate between the service rendered by a bank in loaning money and the service which a finance company renders in discounting a conditional sales agreement. Obviously the charge for the service performed would depend upon the scope of the work done. The finance company renders a complete service and, in addition, of course expects to make some profit. In Chart II, I have broken down the finance dollar, namely, the amount charged by the finance company for the service it renders to indicate

Chart 2. The finance dollar

not only the expenses which it undertakes but also the approximate proportion that they bear to the total expense. If we compare this with bank service, we will see that a great many of these items are eliminated and, for that reason, there can be no direct comparison between bank interest and the amount of a finance charge.

The problem is difficult but not hopeless in my opinion. I believe that if we can separate the question of terms from the inducements which we must offer to overcome basic sales resistance, it may be possible to find an adequate solution. For example, a trial plan in which the risk during trial is borne by the gas company may effectively develop a large volume of business and a satisfactory experience on the part of the renters, so that at the expiration of some definite period of time they will be perfectly willing to purchase the apparatus on reasonable terms. Such conditional sale paper would certainly be prime from the credit risk point of view because it represents a sale to a customer who has had the opportunity of experiencing the comfort and convenience of the device in his own home and who had sufficient knowledge of its cost of operation to be satisfied with his bill for service.

The companies with which I am associated attacked the problem from this latter point of view and with the cooperation of one of the national finance companies were able to work out a cooperative finance plan for the benefit of dealers in their territory which has worked with satisfaction to all concerned. This plan which is called the "Economy Purchase Plan" is made possible through the cooperation of the appliance manufacturer, the utility company, the retailer and the customer, each one contributing something to the end that the resultant plan at the time it was announced represented the most favorable basis on which a purchaser could buy an appliance on time through an independent retail dealer.

Apparently the success of this plan, coming at a time when all financial institutions were under pressure from the Administration in Washington to loan money on more advantageous terms, has resulted in some revolutionary changes in the attitude of these institutions. Urged on the one hand by the Federal Housing Administration to get into the small loan business and threatened with the extension of the Electric Home and Farm Authority plan throughout the entire country, various financial institutions have come forward with radically new plans which certainly are vast improvements over those available a few years ago. I will not attempt to discuss the details of any of these plans as the picture is changing from day to day. I will simply mention some of the most recent developments along this line for the benefit of those who are interested in obtaining more detailed information:

The Rochester Gas and Electric Company has been able to work out in cooperation with the Lincoln Alliance Bank and Trust Company of Rochester a plan for handling dealer paper on terms so satisfactory that the gas company is quite content to follow the same terms and conditions which the dealers are now able to offer.

While the F.H.A. loans have not been a complete success as far as their application to appliances is concerned because of the red tape involved and the number of different people with whom the purchaser must deal, they offer a distinct possibility.

One of the most recent developments is the entry of the First Bankcredit Corporation into the field on a broad scale and the plans which they suggest offer distinct possibilities in those communities where they are prepared to render service. For those companies who are either engaged in a heavy rental program or who are themselves discounting dealer paper and find the large requirements for capital are pressing, a new plan has been developed by the Chase National Bank which offers possibilities in this connection.

I have purposely tried to avoid drawing any conclusions in this paper, for the subject itself is so broad and the situation is changing so rapidly that opinions today might be out of date tomorrow.

HOME SERVICE COMMITTEE

BEATRICE WAGNER, Chairman JESSIE McQUEEN, Secretary

New Methods in Poultry and Egg Cookery

Clara G. Snyder

By CLARA GEBHARD SNYDER

Institute of American Poultry Industries, Chicago, Ill.

THIS brief presentation might almost correctly be entitled, "The Glorification of the Moderate Temperature." But I shall try to say something besides, "Use moderate temperatures for best results in egg and poultry cookery." There are a few basic rules to observe in egg cookery if one seeks most satisfactory results. The first of these is that eggs are a perishable food and must be handled as such, even when the egg meat is still in the shell,—and that means refrigeration.

Another rule is that for separating yolks from whites, it is best to have the eggs cold, because the fat which composes about one-half of the yolk is relatively firmer when cold, and the cold yolk separates cleanly from whites, and with the minimum danger of yolk breakage. For beating, however, best results are obtained when the eggs, both whites and yolks, are at room temperature. That is just the opposite procedure from that for cream. Not only does egg at room temperature, 72°, yield greatest volume as a foam, but that volume appears to be transferred to the cake.

Cold Storage Eggs

Perhaps this is the place to say something about cold storage eggs. The eggs that went into refrigerated warehouses last spring are now coming out,—and will give excellent results in all kinds of cookery, in cake baking actually superior to the freshly laid eggs we are getting now.

One egg cookery product in which women seem always to be especially interested is angel food cake. I hope all of you have had copies of our angel food cake bulletin. Here I should like only to say that we are quite enthusiastic about recommending what we call the meringue method of angel food cake making. By that we mean beating most of the sugar into the egg white with a rotary beater or by machine, then sifting and folding only a small portion of it in with the flour. Flavoring is added when the salt and cream of tartar are added,—that is, when the egg white has become foamy.

Presented before Home Service Meeting, A. G. A. Convention, Chicago, October 15, 1935.

In order to keep the brown crust on the cake instead of letting it stick to the pan, we have found this procedure most helpful: before pouring the batter into the pan rinse the pan with cold water, just as for a gelatin mold. Shake out the excess moisture and pour in the batter.

Angel Food Cake

In an angel food cake study now in progress, in which we bake four full-size cakes each Wednesday, we have been baking one cake of each series at 350° F. for 45 minutes instead of at 325° F. for one hour, the usual temperature and time. Although the study is not completed, our figures to date would seem to indicate that the higher temperature for the shorter time results in lower moisture loss from the cake—a desirable thing. So far, for 41 cakes baked at 325° F. for an hour the average moisture loss has been 11.2% while for 11 cakes baked at 350° F. for 45 minutes the loss has been 9.7%,—a difference of 1.5%. Although the data are still too few to draw conclusions, the results have been remarkably consistent. Moreover, the height measurements of the finished cakes seem to indicate a volume in favor of the cakes baked at the higher temperature.

For souffles, the lower temperature,—300° to 325° F.—still seems most desirable. But with modern well-insulated ovens it is not necessary to set the dish containing the souffle into another containing water. That practice originated in the days when oven temperatures couldn't be easily controlled, and the water jacket helped to protect the souffle from sudden temperature changes. Incidentally, baking a souffle without setting it into water is a good way to tell the story of the performance of a modern oven and its temperature control.

An insignificant trick, but a helpful one, that we have been practicing in the laboratory when we make angel food cakes from whole eggs is to hard cook the yolks. They keep well without drying out and lend themselves to many interesting uses. The simplest way we have found to hard cook the yolks is to drop them into simmering water, cover and let simmer for 15 minutes. They should not, of course, be cooked in an iron pan, or they will discolor.

As for custard pies, they can be baked satisfactorily at a shockingly high temperature—400° and even 425° for 30 to 35 minutes. High temperatures seem to keep the crust flaky and crisp, and they seem not to harm the custard if care is used near the end of the baking period not to let it overcook. 350° F. for 45 minutes gives excellent pies.

And now about poultry. The one general rule that applies in all poultry cookery, whether it be broiling, frying, roasting or stewing, is to use low or moderate temperatures. It is always disturbing to me to see on some oven temperature controls the word "broiling" after the temperatures of 450° and up. More chicken is spoiled by the use of too high cooking temperature than in any other way. Chicken cooked at high temperatures tends to be stringy, and when a stringy product results, usually the chicken instead of the cook gets the blame.

Poultry Cooking

Good results in broiling chicken are obtained when the temperature control is set at 350° F. The portions of chicken which have been brushed with unsalted fat are placed skin side up about 4 or 5 inches from the flame. After 10 or 12 minutes the pieces are turned cut side up and they are allowed to cook for 20 minutes longer. If the skin side is not quite so brown as desired, it may be turned up for a few minutes and browned. A little melted butter is poured or brushed over before the birds are taken to the table.

In roasting all kinds of poultry, the moderate temperature (350° F.) gives excellent results. After stuffing and trussing, which may, if desired, be done the day before the chicken is to be cooked, the bird is brushed with unsalted fat. Unsalted fat prevents blistering of the skin during cooking. The chicken is cooked, covered, at 350° F. for the entire roasting period. Basting is not necessary, and putting water into the roasting pan is highly undesirable. About 28-30 minutes per pound should be allowed. The larger the bird the shorter the cooking time per pound. The total cooking time will, of course, be longer for a larger than for a smaller bird. We still prefer to cover poultry during roasting, since we believe this method keeps the skin tender and crisp. If there is any difference in amount of evaporation when roasting birds are cooked covered or uncovered, it is so slight as to be difficult to detect merely by tasting.

(Continued on page 471)

INDUSTRIAL GAS SECTION

CHARLES W. GALE, Chairman EUGENE D. MILENER, Secretary RALPH L. MANIER, Vice-Chairman

The Application of Gas-Fired Radiant Tubes to Porcelain Enameling

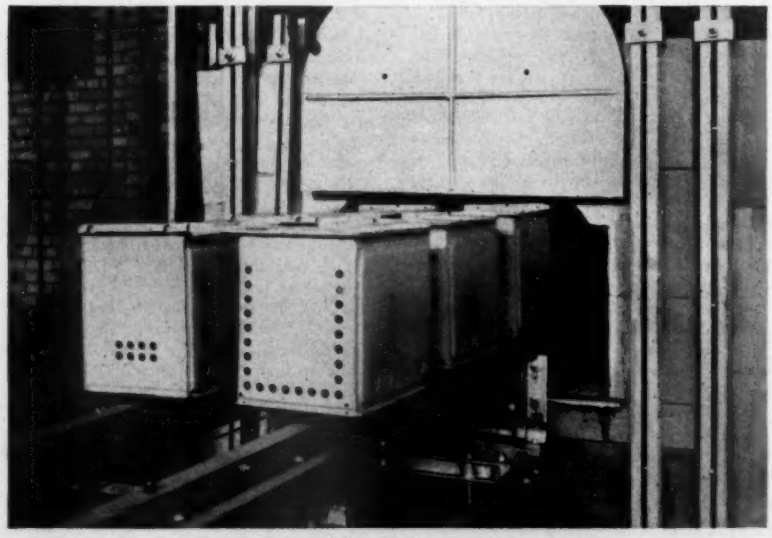
Arrangement of radiant gas tubes

By EDWARD J. GEHRIG
Asst. Superintendent, Detroit-Michigan Stove Co., Detroit, Mich.

THE Detroit-Michigan Stove Company manufactures a well-known line of gas cooking and heating appliances. The equipment required to produce these appliances has undergone constant changes, just as designs change from year to year. Perhaps no equipment has had more changes from an engineering standpoint than the enameling furnaces in the enameling plant.

For some time the equipment has consisted of six gas-fired, box-type muffle furnaces and one continuous hairpin-type enameling furnace. Although both of these furnace types represent the best in design and engineering as we know today, yet, as a matter of fact, they still have certain deficiencies. Heat to the ware in the furnace chamber is transmitted through a muffle, which at its best, is inefficient. Muffles are not impervious and sooner or later cracks appear and products of combustion enter the burning chamber. Since the atmosphere surrounding the ware is then uncertain, various difficulties arise in connection with firing the ware.

The method of applying heat and the resulting furnace atmosphere are chiefly responsible for the physical appearance of the enamel surface as well as the bonding of the ground coat. A strictly oxidizing furnace atmosphere is the prime requisite for best operating results. Muffle repairs or replacements are barriers against continuity of operation, costly and often the cause of unexpected breakdowns. Electric furnaces have on the whole a fine record of performance despite the fact that operating costs are high and the danger of shutdowns caused by short circuits is always prevalent.



Work entering radiant tube gas enameling furnace

Over a period of years there have been a number of improvements in gas-fired enameling furnaces. However, studies instigated by the Committee on Industrial Gas Research of the American Gas Association indicated that rather radical changes in design of methods of applying gas heat were possible and that these changes gave promise of incorporating every feature of electric furnaces with some advantages over the latter, notably lower operating cost. The committee reached the conclusion that these objectives could be obtained by heating enameling furnaces with gas-fired radiant tubes placed in the furnaces in a manner similar to the way electric heating elements are installed. Gas radiant tubes in the last couple of years have been developed to the point where practically any heating capacity can be readily taken care of. The adaptation of these tubes to enameling furnaces represented, first, an engineering problem and, second, the need for demonstrating the practicability of this whole method of firing. These were among the objectives of the Committee on Industrial Gas Research in sponsoring this development.

Gas has always been used in many enameling installations but, perhaps, with some degree of uncertainty or haziness as to the effect upon the ware. However, with gas-fired radiant tubes, the furnace

atmosphere becomes as free from contamination as any existing type of enameling furnace on the market today.

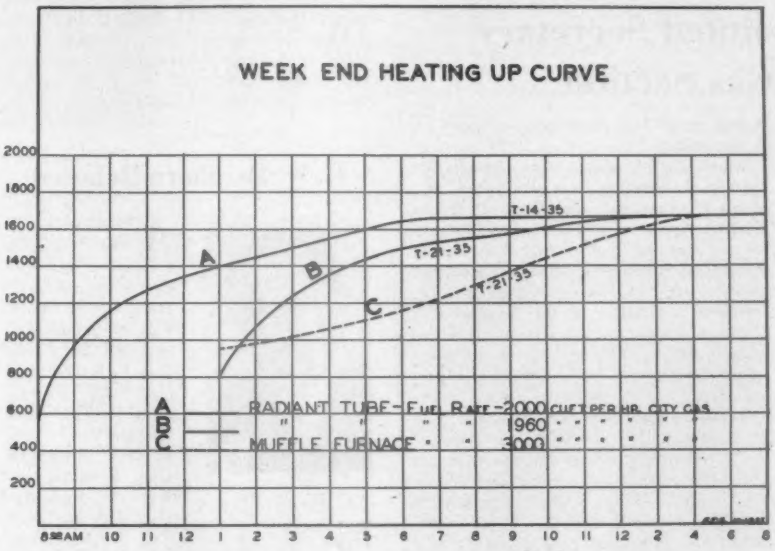
The conversion of the furnace merely entailed removal of the furnace muffle and substitution of radiant tubes. We have now a gas furnace possessing every advantage of electric heat as applied to static surface heating.

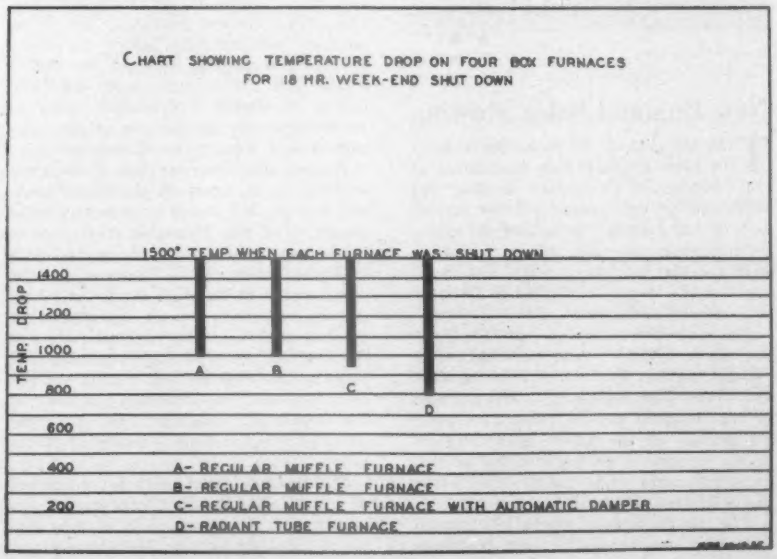
The furnace has been in continuous operation for over four months and the results obtained are gratifying both from a production and economical standpoint. The work performed has been of equal quality, if not better, than that obtained from a full muffle furnace. The more lustrous gloss produced in the radiant tube furnace is attributable to the strictly oxidizing furnace atmosphere which is at all times free from harmful gases, a very necessary requirement for vitreous enameling. In fact, gas radiant tubes as the heating agent for porcelain enameling are not only practical but basically economical because of the high radiant heat emissivity of alloy tubes and the proximity of the work to the source of heat.

The working dimensions of the box type furnace were not affected by the conversion. There are six hairpin-type radiant tubes installed, four on the furnace hearth as support for the work and one on each side wall. The tubes are fired from the rear of the furnace by means of special diffusion gas burners. The operation of the radiant tube is very simple and easy. The tubes are at all times under negative pressure or suction, which is produced by injecting blower air into a small stack or eductor at the end of each tube. This suction serves three purposes: First, it permits the fuel gas entering the firing end of the tube to draw in just enough air for complete combustion, and second, it preserves the non-turbulent flow of the highly luminous flame thus developed throughout the entire length of the tube which assures uniformity of heat distribution. Third, it maintains a negative pressure within the tubes with the result that there can never be any discharge of combustion gases into the working chamber of the furnace.

Combustion within the tube can be maintained almost to the point of lowest flue loss. This is quite evident to the enameler who has been accustomed to see red hot gases belching forth from the flues of a muffle furnace. The tubes operate with perfect safety, both ends of the tubes always being open to the atmosphere. Adjustment of the burners can easily be maintained.

Maximum temperatures inside of the tube wall do not exceed 1850° F. which is sufficient to produce a furnace or outside tube temperature of 1600° F., at which temperature our furnace is generally operated. Compared with muffle furnaces, temperatures of 2000 to 2200° F. are necessary to obtain 1600° F. in the furnace proper. These figures undoubtedly represent economies in fuel consumption, yet producing a normal comeback which indicates that the important contributing factor lies in the rapid heat transmission of the alloy tubes upon which the ware is placed and burned.





Furnace "Comeback"

In every batch-type porcelain enameling furnace there is always a drop in temperature caused by opening the door together with the weight of the cold material when charging a new load. The time required to regain the original temperature is commonly termed the "comeback" of the furnace In any new type of furnace, the pertinent question asked is "What come-back has this furnace?" The gas-fired radiant tube enameling furnace has a normal come-back as compared with a muffle furnace. This was demonstrated by running the same charge at the same temperature by the same operators for more than a three-day period. So one can say that the stored heat in muffles is not altogether necessary to produce a normal come-back. If the box furnace has sufficient depth in its walls together with a good layer of insulation, these walls then provide sufficient stored heat to compensate for the sudden drop in temperature. This is highly augmented by the fact that the radiant energy released by the tube is directly transmitted to the ware itself, giving extreme flexibility in operation.

Door losses are dependent upon the lift of the door and can hardly be altered owing to the loading conditions and the shape of the ware which determine the duration and height of the lift. However, the loss through the door itself, the door openings, etc., can be materially minimized by the use of proper design and insulating material.

The heating-up period of the gas-fired radiant tube furnace is as fast as one

might desire as the heat is readily transferred to the effective areas inside of the furnace. A clearer idea can be ascertained from the week-end heating-up curve which shows a comparison between the two furnaces, muffle and radiant tube. On the contrary, the cooling-off of the radiant tube furnace over week-end shutdowns for instance, is much slower than one would anticipate in view of its rapid heating-up facilities The retarded rate of cooling-off of the furnace and tubes is undoubtedly due to the lack of vents or flue passages within the furnace structure.

From the plant operator's standpoint, the greatest factor of all in the gas-fired radiant tube application is the ability to foresee a breakdown or, better yet, the ability to repair defective tubes without disabling the major unit. This feature in itself represents a very tangible saving in costly repairs, in lessening the loss of production and damage done to a repaired furnace by heating it up too quickly, as is sometimes done, in order to get it back into production.

In the event that a tube should in time become defective, which is not impossible, the situation becomes indeed most favorable. The solution would be to keep a piece of repair tube on hand, as each radiant tube can be quickly and easily removed. It is only a matter of letting the temperature drop, remove the burner and eductor casings on the outside of the furnace, repair or replace the defective tube and operations can go on unimpeded. These facilities will considerably cut the repair cost over conventional furnaces and reduce the lost production time to a minimum.

E. D. Milener Appointed Secretary of Industrial Gas Section

E. D. Milener

ANNOUNCEMENT has been made by Alexander Forward, managing director of the American Gas Association, of the appointment of Eugene D. Milener as secretary of the Industrial Gas Section. Mr. Milener succeeds C. W. Berghorn, who has resigned to become executive secretary of the Association of Gas Appliance and Equipment Manufacturers.

Mr. Milener, who is a native of Virginia and a graduate of Baltimore Polytechnic Institute and the University of Maryland, has been a member of the Association's Headquarters staff for seven years. Previously he had held various positions with Consolidated Gas Electric Light & Power Company of Baltimore, including supervisor of industrial and house heating sales. He was one of the small group of men who pioneered and first introduced central house heating with manufactured gas and has seen it grow to be one of the most important activities of gas companies.

In 1915-16 he devised and first applied what has since become known as the "Degree-Day" method of calculating and comparing the gas requirements for heating different types of buildings under varying temperature conditions. This method is now universally used throughout the gas industry and by the heating, ventilating and air conditioning industries. Some years later Mr. Milener proposed and first used the analysis of the four winter and four summer factors that compose year 'round air conditioning, which analysis is now the generally accepted method of describing comfort air conditioning.

When the American Gas Association Testing Laboratory was instituted Mr. Milener organized the Central House Heating Approval Requirements Committee and was chairman of that body during the period when the Approval Requirements Code was being compiled. He was also a member of the original Gas Tubing Approval Requirements Committee. He has also served on the Managing Committees of the Commercial and Industrial Gas Sections.

As a member of Headquarters staff Mr. Milener has directed the Association's research activities in industrial gas utilization and has recently undertaken similar work in the domestic field. He will continue as secretary of the Committee on Industrial Gas Research and the Committee on Domestic Gas Appliance Research.

New England Sales Meeting

THE meeting of the Sales Division of the New England Gas Association at the Chamber of Commerce, Boston, was witnessed by the unusually large attendance of 248 persons. Outside of the spring Refrigeration meeting, which has been held for the past three years, this meeting was the largest of any Sales Division meeting for some years.

The title of the meeting was "The Passing Show of 1935" and sub-titles were "Time Marches On," "Gas Marches On" and "New Developments." The purpose of the program was to present an overall picture of the latest sales developments in several pertinent fields so that members could study the progress being made in New England.

The program consisted of 10 papers of 6 to 8 minutes each. The transition from one speaker to another was emphasized by a cornetist who was hidden in the balcony of the dining room and who played short marches between papers.

The list of papers and speakers follows: "Gas Flood Lighting" by John J. McKearin, Lowell Gas Light Company; "Kitchen Heating" by A. W. Borg, Connecticut Light & Power Company; "A Sales Expansion Program" by R. J. Rutherford, New England Gas & Electric Association; "The Teakettle Heater" by W. E. McCreery, Blackstone Valley Gas and Electric Company; "Conversion Water Heaters" by Benjamin J. Bean, Worcester Gas Light Company; "What About Air Conditioning?" by Carl H. Cummings, Industrial Appliance Company of New England; "Surveys and Sales" by L. B. Crossman, Boston Consolidated Gas Company; "The Black-and-White-Range Rental Idea" by John F. Wood of the Lowell Gas Light Company; "Clock-Control Ranges" by J. L. Johnson, Providence Gas Company; and "The 1935 Metropolitan Boston Cooperative Range Campaign" by J. J. Quinn, Boston Consolidated Gas Company.

C. W. Berghorn Honored

C. W. Berghorn

A FEATURE of the luncheon meeting held in the Commodore Hotel, New York City, November 12, attended by President L. B. Denning and the newly elected officers and headquarters staff of the American Gas Association, was the presentation of an engraved silver cigarette box to C. W. Berghorn, former secretary of the Industrial Gas and Manufacturers' Sections. The presentation was made by Major Alexander Forward, managing director, on behalf of the staff. Mr. Berghorn left the Association November 1 to become executive secretary of the Association of Gas Appliance and Equipment Manufacturers.

Joining the American Gas Association in 1922, as secretary of the Manufacturers' Section, Mr. Berghorn was also made secretary of the Industrial Gas Section upon its organization. He was closely associated with N. T. Sellman in the organization of the A. G. A. Testing Laboratory and managed all manufacturers' exhibits at A. G. A. conventions. He was the first secretary of the Industrial Gas Research Committee and, during the period of NRA, was secretary-treasurer of Gas Appliances Institute. He graduated in 1913 from Stevens Institute of Technology.

Mr. Berghorn's secretary for a number of years, Miss B. M. Cruickshanks, has also joined the Association of Gas Appliance and Equipment Manufacturers.

TECHNICAL SECTION

F. A. LYDECKER, Chairman H. W. HARTMAN, Secretary MARTIN I. MIX, Vice-Chairman

Observations on Soil Corrosion Mitigation in the Gas Industry

By SCOTT EWING

A. G. A. Research Associate

Scott Ewing

THE observations which have been made on a trip over the country indicate that there is a serious attempt on the part of the gas companies to take advantage of all that is known about coatings and corrosion. Many companies have altered their coating practices within the last few years, probably largely because of the coating and corrosion research of the National Bureau of Standards, the American Petroleum Institute, and the American Gas Association.

Most of the companies, however, have not as yet adopted a definite coating program and policy, probably because they are skeptical as to the necessity or value of the coatings. With the data on repairs and replacements, which the average gas company has, it is usually not possible to demonstrate with a logical argument exactly where coatings should and should not be used But a study of the data by the company will at least be of considerable help in deciding where coatings should be used. There is believed to be a general tendency in the industry toward the more extensive use of adequate coatings.

I. Introduction

The Subcommittee on Pipe Coatings and Corrosion of the American Gas Association decided to remove the third set of coated pipe specimens during the summer of 1935. Two of the four sets, which were buried in 1929, had already been removed. It was the opinion of the subcommittee that since the Research Associate would be within a few hundred miles of almost any point in the country at some time during the trip, it would be desirable for him to consult with gas companies on their local corrosion problems. Arrangements were accordingly made through the offices of the Association whereby any gas company could obtain the services of the Research Associate for whatever length of time was thought necessary.

A period of approximately 4 months was spent in the field, during which time 14 sets of coated pipes were removed and tested and 13 companies were visited. The extremities of the route included Miami, New Orleans, Houston, Los Angeles, Milwaukee, and Boston. A total of 13,000 miles was covered, travel by automobile being necessary in order to carry the testing equipment. The report is a discussion of some of the observations made on the trip. Only those things are discussed which are believed to be of general interest, either because they are new developments or because they are at least partial answers to often-asked questions.

Figure 1. Containers for carrying bitumen on truck and melting tank used to fill them

II. Condition of the A. G. A. Coatings

A full report on the coated pipes which were removed and examined on the trip will probably be published soon. No attempt will be made here to discuss the results of these inspections.

III. Observations of Pipe Coating Practices in Distribution Systems

1. JOINTS AND THEIR PROTECTION. In the distribution system where the individual job is usually a small one and is often in a congested city street, the use of a large kettle for heating the bitumen is out of the question. However, some companies are able to properly coat the joints on services and other small jobs with hot bitumen without any particular difficulty. Various kinds of containers are used to carry the asphalt or enamel on the truck. These include cheap one-gallon tin cans, which can be cut with an ax to remove the bitumen, or one-foot lengths of 6- or 8-inch pipe made by a welder into the form of a teakettle by attaching a bottom, spout and handle.

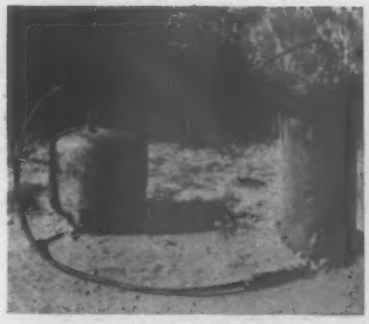


Figure 2. Method of heating the containers of figure 1 on the job

Figure 1 shows some of these containers and the melting tank used to fill them. The material is heated on the job in a small heater made by the welder. The fuel may be bottled gas or some inflammable liquid. Figure 2 shows the method of heating these containers with bottled gas. Figure 3 is another type of bottled gas heater and kettle in which the burner is placed on top of the bottled gas container. The men soon learn at what time the heating should begin. The pipe is warmed with the welding torch, primed with a very thin coat, and the hot bitumen and wrapper are applied with little loss of time. Detailed step-by-step instructions for wrapping joints have been prepared by the Los Angeles Gas & Electric Co. for the use of their street foremen.

2. NEW PROTECTIVE MEASURES. Each of the three large gas companies in the Los Angeles area uses a different protective method in the more recent installations. Obviously the methods cannot all be the best, but unless different methods are tried the best will never be found. One company is using copper pipe, another, an asphalt coating with no reinforcement but with a kraft paper shield, and the third has recently used considerable quantities of Cellophane and Kodapak as reinforcing materials.

The unreinforced asphalt covering is more resistant to moisture absorption and is also more stable chemically than the rag-felt reinforced coating which was

Figure 3. Another type of bottled gas heater and kettle

previously used. If the coating will stay on the pipe there is no need for the felt reinforcement. The soils in the Los Angeles area are nearly all sandy, and numerous inspections of coatings have shown that soil distortion is not severe. The felt also makes it possible to build up a thicker coating. This is accomplished without using felt by directing air jets onto the coated pipe as it passes through the coating-machine, thereby cooling the asphalt as it flows over the pipe and making more of it stay on.

The Cellophane and Kodapak seem to serve every purpose that the felt serves, and they have the advantage that they do not absorb as much moisture and they are cheaper. These coatings were inspected in several places and their appearance was certainly impressive. The method of using these materials is described by Lee Holtz in *Western Gas* for October, 1935. Figure 4 is a photograph of a Kodapak reinforced coating. On the left the outer coating has been peeled off, showing the Kodapak reinforcement.

3. DEVELOPMENT OF COATING PRACTICE BY A CALIFORNIA COMPANY. In any engineering project it is usually considered necessary to do more or less experimental or investigational work in order properly to carry out the project. Certain data are necessary if coatings are to be chosen properly and used in a distribution system. The data were collected by this company by issuing to street gangs the following instructions:

1. To take a 1-foot sample of every piece of pipe that was being replaced, to tag it properly, and to put it in a designated place. Printed linen tags to identify the samples were provided on all trucks. Thousands of samples of pipe whose age and place of exposure are known were thus collected at little cost. These specimens, cataloged and preserved, are valuable for many purposes.
2. To inspect every pipe uncovered. On special forms thousands of inspection reports were thus collected which give valuable data as to the condition of mains, services and coatings.
3. To collect soil samples at every opening, appropriate containers and tags being provided for this purpose.

The entire organization thus soon became corrosion-conscious. We have water-heater campaigns, house-heating compaigns, safety meetings, safety committees, and safety-conscious men. These things are done because they produce results. If a man drags out a leaking service, throws it on the truck and then off the truck on the junk pile, he merely feels that corrosion failures are among the inevitable things and thinks no more about it. If, however, he has to cut a one-foot length of the pipe and to tag it, he notices more closely and he might begin to think about it. In the meetings there would be discussion, argument and questions. The men will become more interested and notice many things in the course of their work that would otherwise never be seen. The net result ultimately will be better knowledge of where corrosion occurs and better methods of preventing it.

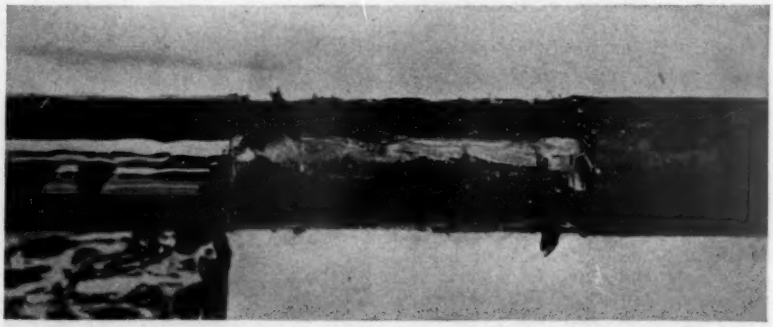


Figure 4. Kodapak reinforced coating

The soil samples were tested using the Corfield method. The pieces of pipe and the pipe-inspection reports were compared with the soil tests, and this resulted in the development of considerable confidence in the soil test. A map of the distribution area was then made showing: (1) areas where coatings are not necessary, (2) areas where coatings are needed, and (3) areas where special protective methods are necessary.

The men in the company are able to talk with assurance and conviction about their methods and practices. They know that the coatings are protecting the pipe and they know that coatings are not necessary everywhere. It took this company about 20 years to pass through the maze of pipe coatings to a reasonably good method of reducing corrosion costs to somewhere near the minimum. This was all done by the company with very little outside help. The maze is now more complicated so that it would probably take a company with equal technical advice and aggressive management at least 20 years to reach this stage of development from the random choice of a coating, and eventually to find a suitable coating and the proper places to use it.

The history of this company's practices has been given because it is believed that some of the practices should be considered and perhaps adopted by other companies. Several other western companies use methods almost identical with those described, but this is the only company where a complete history of coating practices was available.

IV. Consulting Work with Gas Companies

The consulting work with gas companies has been rather varied in character. In some cases it has consisted in questioning on the part of the gas engineers about general principles of coatings and corrosion. Other companies wished to obtain a general idea of the soils in their distribution area and how they could be tested. There were a few requests for advice about a particular problem, and a few cases where the company wished to begin a broad program to reduce corrosion costs, if possible.

In specific cases where a line is to be laid in a particular place, it is an easy matter to express an opinion and then to give some arguments to support it. The companies visited were usually the larger ones, and in general, they are the ones that follow the best practices.

The methods of mapping soils which were developed and are used by the Soil Survey Division of the U. S. Department of Agriculture are useful, but it is often difficult, if not impossible, to use these methods in cities when very little of the original surface is left and when most of the soil is covered with pavements and buildings. It is believed, however,

that it is generally desirable to make a map of the distribution area which shows those places where coatings should be used and places where pipe should be laid bare.

The map is necessary because it is the only way to insure the proper kind of protection whenever a pipe is being laid. Someone in the company probably knows what the soil conditions are in some particular street but this person may not be available when the truck leaves the yard to lay the pipe in this street. The details of how this map should be made will depend upon the local situation. In older areas the combined knowledge of all street foremen and others who are familiar with the soil conditions may be the best and cheapest way to make the maps. In some places along the seacoasts the Shepard Resistivity Meter, combined with a little good judgment, is a convenient way to locate areas that contain or are likely to contain salt water. Plotting of service replacements during the preceding few years may be of some help, but it must be remembered that the services are not of the same age and that corrosion leaks are not the only reason for replacing services.

Electrolysis

In many distribution systems electrolysis is probably still a cause of numerous pipe failures. Even if the gas company does no electrolysis testing, the telephone and power companies always watch their cable sheaths and see to it that there are no, or at least very few, extremely bad electrolysis conditions. Those conditions that are evidently very serious have usually been corrected, whether the gas company knows it or not. It is practically impossible to eliminate electrolysis entirely.

Many services that cross streets under car tracks or pass near cable ducts are ultimately corroded until they require replacement. The services are usually rather old and the voltages rather small, so that it is not worth while to correct the condition. Nevertheless, the service would probably still be in good condition were it not for the electrolysis. About the only thing that can be done in such cases is to replace the service either with extra heavy pipe or with a coated service, and to install insulating joints at the main and near the meter. The plotting of service failures on a map of the distribution area may show by the grouping of the replacements around subway substations whether electrolysis is the cause of any failures.

There is a characteristic trend in the annual expenditure of any company to combat corrosion. As the system grows older the frequency of corrosion failures is bound to increase unless the company adopts effective corrective measures and continues to use them so that finally the annual expenditure begins to decrease. If the company operates in a territory where the soils are very corrosive, the annual costs increase rapidly and extreme methods must be adopted immediately. When the soils are less corrosive the costs increase much more gradually, the allowable expenditure for coatings is less, and their value is not so apparent. Some of the western companies are already definitely over the peak. Even though they are older, most eastern companies will probably find that their annual costs of corrosion are still increasing, and they will continue to increase until each company investigates its own situation and applies effective mitigative measures.

In a few places coatings may be used unnecessarily, but there is a tendency toward the more general use of good coatings, which is as it should be.

The writer wishes to express his appreciation of the excellent cooperation which he received at every test site and of the interest shown by the companies with whom he worked in a consulting capacity.

Convention Calendar

DECEMBER

11 The British Gas Federation
London, England

1936

FEBRUARY

13-14 New England Gas Association
Boston, Mass.

19-21 Gas Institute of New Zealand
Christchurch, N. Z.

26-28 Southern Gas Assn. Annual Convention and A. G. A. Sales Conference
Roosevelt Hotel, New Orleans, La.

MARCH

2- 6 Regional & Group Meetings of A.S.T.M.
Pittsburgh, Pa.

APRIL

13-15 Mid-West Gas Association
Minneapolis, Minn.

MAY

5- 8 A. G. A. Natural Gas Department
Baker and Adolphus Hotels, Dallas, Texas

JUNE

29-July 3 American Society for Testing Materials
Atlantic City, N. J.

JULY

8-10 Canadian Gas Association
Vancouver, B. C.

POULTRY AND EGG COOKING

(Continued from page 465)

I believe all home service directors have had copies of our "Notes on Turkey Cookery." In it we tried to cover methods we have found most satisfactory. Since few roasters have covers which will fit down over a turkey, it is a good plan to cover the bird with a tent of heavy paper that may be oiled, with a clean white cloth that has been oiled, or with a pastry-like paste. The turkey cooks satisfactorily on the broiler pan which not only serves as a roasting pan but in which the gravy may later be made.

Before leaving the subject of turkey, I do want to mention the matter of the half turkey. Several years ago we dared suggest that a whole turkey was too much for many small families to buy, not so much as a matter of first cost, as a matter of having to dispose of a somewhat generous supply of turkey meat. I was of the opinion that more people would eat turkey at home if they could purchase a half turkey. Most of the homemakers to whom we broached the idea were enthusiastic about it. Some of them were skeptical about the practicability of it until the preparation of it was demonstrated to them. The problem, however, has been to get retail dealers to sell half turkeys. They are afraid they will have losses. To take care of this objection, we have suggested that two women together select a turkey and then have the market man cut it into halves. The cookery method is the same as for a whole turkey. The stuffing is put into the cavity on the under side, then it is covered with parchment or brown paper, the roaster or broiler rack is placed over it and the whole is inverted. It really works out quite well. I think that eventually we may purchase half turkeys everywhere. I hope to be able to convince the packers of quick-frozen, ready-for-the-pan poultry of the feasibility of packing some of their turkeys in halves.

And now just a few words about frozen poultry. Those of you who are familiar with it know it is a satisfactory product. It gives greatest satisfaction, however, when the birds are defrosted in a refrigerator rather than in water. Soaking any kind of meat in water is hardly to be recommended, and certainly that is so for poultry.

I have not touched much on the matter of refrigeration and what I call community refrigeration. I have tried to restrict myself chiefly to the actual cookery. I should like to add in closing that I hope all of you will always feel free to consult the home economics department of the Institute for information about eggs and poultry. The department seeks to be a service department, and its information is always at your command.

"MYSTERY CHEF" PROGRAM

(Continued from page 439)

patch. Sift flour over the rolling pin and over the dough, then roll the dough lightly to half-inch thickness. Cut the dough, with the knife, into pieces about 3½ to 4 inches square, or cut in triangles, or into any shape most convenient. Put these cut pieces of dough onto flat ungreased pans. Turn the oven heat regulator on your gas range to 300 F. (slow oven) and bake for 30 to 35 minutes. Remember these scones must be baked in a slow oven and baked for 30 to 35 minutes. Bake some of these delicious Scotch Scones today. I know you will be delighted with them. And now let me urge you to always be the artist at the gas range and not just someone who cooks food. God gave you great talents and gave you mothers and homemakers his greatest work to do.

All of the greatest powers of this world work silently and unseen. Imagine a circle 30 miles around your home. Suppose there is a one-inch rainfall in that circle. You would hear the rainfall but you could not have seen or heard the two hundred million tons of water being lifted two miles into the air. Yet that very thing did happen before a one-inch rainfall could fall in that 30-mile circle. Two hundred million tons of water lifted two miles into the air . . . . think of it. Man has no machinery that could begin to lift two hundred million tons and yet these great forces of Nature are working around us performing these miracles silently and unseen.

When you cook a delicious meal and you see your family enjoy it and hear them say "Mm! Mm! This is delicious!" Do you think that is all there is to it? The meal has gone. Yes, but the great silent force behind that meal remains. The real thing about your cooking is the silent unseen thing . . . . the building of sacred memories around your dining room table . . . . memories, that in years to come, will make your children talk of those wonderful pies and biscuits that mother used to bake . . . . those wonderful meals that mother used to cook. Do you think they will ever talk about those pies and biscuits that mother used to buy, or exclaim "How wonderful were those cans that mother used to open!" . . . . *Now* is your opportunity to build those sacred memories . . . . and remember if you lose that opportunity it is lost forever.

You, the mothers and homemakers, are the great power behind this nation. America is and will be what you make it. Remember, God gave *you* his greatest work to do. Happiness does not come only from material things, but of all material things nothing adds more to the happiness of your home than does excellent cooking. *Love* is far greater and more important than vitamins. . . . . Put love into your cooking and with loving hands prepare each meal. Always be the artist at the gas range and cooking will always be a real pleasure to you and a source of real happiness to your family and friends.

I see my time is up and I must leave you. I hope you will invite me into your home again each Wednesday and Friday, and that you will ask your friends to invite me into their homes by radio. And now I am going to ask you to listen carefully while Mr. Ben Grauer tells you just how you may obtain your free copy of my new little book.

Thank you, fellow artists at the gas range!

ANNOUNCER: Thank you, Mystery Chef! Ladies and gentlemen . . . . the Mystery Chef's new little book, written specially for this program is now on the press and will be ready about December 15. It covers the whole field of cooking and is written in his own inimitable way with directions given in such detail and in language so easy to understand that your success as an artist at the gas range is assured. The book is filled from cover to cover with vital cooking information that cannot be found in ordinary cook books, and it contains hundreds of really excellent recipes. And now let me tell you how and when you can obtain your copy . . . .

This program is sponsored by Regional Advertisers, Inc., representing a group of gas companies serving a large part of the area from Washington, D. C., to Portland, Maine. If your gas company is one of them, it will advise you of that fact through its regular advertising, and, *after December 15,* when you call at the office of one of these companies you may have, for the asking, your copy of "The Mystery Chef's" new recipe book, entitled "Be an Artist at the Gas Range." But remember the date. The book will be ready for you about December 15 in plenty of time to help you plan your Christmas cooking.

Statement of the Ownership, Management, Circulation, Etc., Required By the Acts of Congress of August 24, 1912, and March 3, 1933

Of American Gas Association Monthly published monthly at Brattleboro, Vt., for October 1, 1935.
State of New York, County of New York, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared James M. Beall, who, having been duly sworn according to law, deposes and says that he is the editor of the American Gas Association Monthly and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in Section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Gas Association, Inc., New York, N. Y.; Editor, James M. Beall, New York, N. Y.; Managing Editor, None; Business Managers, None.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is . (This information is required from daily publications only.)

JAMES M. BEALL, Editor.

Sworn to and subscribed before me this 25th day of September, 1935.
(Seal)

LAWRENCE P. BROWN,
Notary Public, New York County.
Clerk's No. 482, Register's No. 6-B-353,
(My commission expires March 30, 1936.)

GAS SALES AS AFFECTED BY TEMPERATURES

(Continued from page 451)

Considering now the B portion of the consumption entering into the February report, the temperature on February 1 has a weight of 22½ unit-days, since the temperature on that day affects one-half the consumption of the first meter unit, and all of the consumption of the remaining 22 units (where the total number of units in this month, as we saw, was 23). Similarly, the temperature on February 2 has a weight of 21½ unit-days, etc. These weights grow progressively smaller as we advance toward the end of February, until we reach a weight of ½ meter-day on February 28. However, a unit-day in February does not have the same value as a "unit-day" in January, since a unit in February is 5,200 meters, while a "unit" in January is only 4,600 meters. Or, putting it another way, a February unit-day represents 5,200 "meter-days" of weighting, whereas a January unit-day represents 4,600 "meter-days."

Summing up the weights above described, the A weights of daily temperature grow progressively larger and the B weights progressively smaller as we advance in the consideration of the relative importance of the successive daily temperatures. This means simply: that the successive daily temperatures in January affect progressively larger proportions of the reported February sales, and that the successive daily temperatures in February affect progressively smaller proportions of this total sales.

(7) CALCULATION OF "WEIGHTED AVERAGE TEMPERATURE" AS COMPOSITE FACTOR

To arrive at a practical and satisfactory composite temperature which recognizes this progressive increase and decrease of daily weighted effect, it requires only the following type of calculation (but not necessarily in this detail or order, as will be explained later):

(1) Multiply each daily mean temperature in January by its respective A weight (in meter-days) to give daily products of "meter-day-degrees," and then obtain the sum of all of these products.

(2) Multiply each daily mean temperature in February by its respective B weight to give similar daily products, and then obtain the sum of these B products.

(3) Obtain the corresponding sums of the A and B weights (that is, the meter-days).

(4) Divide the combined total of the A and B products (expressed in meter-day-degrees) by the combined total of the A and B weights (expressed in meter-days). The result is obviously a quantity in degrees; this is the weighted average temperature corresponding to the reported February gas sales.

There are certain short cuts in procedure which reduce this calculation, and the accompanying calculation of the "weighted average billing period" (described in the following paragraph) to a simple monthly routine, requiring only a few minutes each month. This routine is given fully, further on in this article, but one obvious short cut deserves immediate mention, namely: the number of meters per unit need not be introduced into the A calculations until the sum of the weights and the sum of the weighted products are being determined, since the number of meters per unit is a constant throughout in the A calculations. The same is true of the B calculations. Up to the point of A summation and of B summation, all of the calculations may be based on unit-days and unit-day-degrees, and then the number of meters per unit introduced as a final multiplier of the respective summation.

(8) CALCULATION OF "WEIGHTED AVERAGE BILLING PERIOD"

The calculation of the weighted average billing period is a comparatively simple matter:

(1) Divide the summation of the A weights (expressed in unit-days) by the number of A units (i.e., working days in January); this gives a figure in days as the weighted average period represented by the gas consumed in January but reported in February.

(2) Divide the summation of the B weights by the number of B units (or working days in February) to give the weighted average period represented by the gas consumption which occurred in February and was reported in February.

(3) Add both results; the total is the weighted average billing period corresponding to the reported February sales.

TABLE 3

EQUITABLE GAS COMPANY
METERS AND TEMPERATURES
January 1929 Number of Meters 155,848 Number of Working Days 26
(*End of Month*)
Number of Meters per Unit 5,994

Day of Month	*Daily Mean Temp. Deg. F.*	*Units of Meters Read*	(A) For Sales Reported in Feb. *Succeeding Month* *Cumulative Effective Unit Days*	(A) For Sales Reported in Feb. *Succeeding Month* *Cumulative Unit Day Degrees*	For Sales Reported in Jan. *Current Month* *Cumulative Effective Unit Days*	For Sales Reported in Jan. *Current Month* *Cumulative Unit Day Degrees*
1	38	0	.0	.0	26.0	988.0
2	22	1	0.5	11.0	25.5	561.0
3	25	1	1.5	37.5	24.5	612.5
4	30	1	2.5	75.0	23.5	705.0
5	38	1	3.5	133.0	22.5	855.0
6	36	0	4.0	144.0	22.0	792.0
7	17	1	4.5	76.5	21.5	365.5
8	16	1	5.5	88.0	20.5	328.0
9	35	1	6.5	227.5	19.5	682.5
10	36	1	7.5	270.0	18.5	666.0
11	29	1	8.5	246.5	17.5	507.5
12	20	1	9.5	190.0	16.5	330.0
13	12	0	10.0	120.0	16.0	102.0
14	8	1	10.5	84.0	15.5	124.0
15	18	1	11.5	207.0	14.5	261.0
16	21	1	12.5	262.5	13.5	283.5
17	46	1	13.5	621.0	12.5	575.0
18	60	1	14.5	870.0	11.5	690.0
19	42	1	15.5	651.0	10.5	441.0
20	30	0	16.0	480.0	10.0	300.0
21	30	1	16.5	495.0	9.5	285.0
22	34	1	17.5	595.0	8.5	289.0
23	36	1	18.5	1,261.0	7.5	270.0
24	30	1	19.5	585.0	6.5	195.0
25	38	1	20.5	779.0	5.5	209.0
26	22	1	21.5	473.0	4.5	99.0
27	26	0	22.0	572.0	4.0	104.0
28	22	1	22.5	495.0	3.5	77.0
29	16	1	23.5	376.0	2.5	40.0
30	18	1	24.5	441.0	1.5	27.0
31	19	1	25.5	484.5	.5	9.5
Total	—	26	390.0	10,815.0	416.0	11,864.0
(1) Days			15.00	——	16.00	——
(2) Meter Days			2,337,660.0	——	2,493,504.0	——
(3) Meter Day Degrees			——	64,825,110.0	——	71,112,816.0

Note (1): Total Cum. Eff. Unit Days ÷ 26
(2): Total Cum. Eff. Unit Days × 5,994
(3): Total Cum. Unit Day Degrees × 5,994

TABLE 4

EQUITABLE GAS COMPANY
METERS AND TEMPERATURES

February 1929 — Number of Meters 155,827 (*End of Month*) — Number of Working Days 23
Number of Meters per Unit 6,775

Day of Month	*Daily Mean Temp.*	*Units of Meters Read*	(A′) For Sales Reported in Mar. — *Succeeding Month* — *Cumulative Effective Unit Days*	(A′) — *Cumulative Unit Day Degrees*	(B) For Sales Reported in Feb. — *Current Month* — *Cumulative Effective Unit Days*	(B) — *Cumulative Unit Day Degrees*
1	17	1	0.5	8.5	22.5	382.5
2	17	1	1.5	25.5	21.5	365.5
3	19	0	2.0	38.0	21.0	399.0
4	22	1	2.5	55.0	20.5	451.0
5	26	1	3.5	91.0	19.5	507.0
6	36	1	4.5	162.0	18.5	666.0
7	34	1	5.5	187.0	17.5	595.0
8	34	1	6.5	221.0	16.5	561.0
9	33	1	7.5	247.5	15.5	511.5
10	22	0	8.0	176.0	15.0	330.0
11	18	1	8.5	153.0	14.5	261.0
12	17	1	9.5	161.5	13.5	229.5
13	25	1	10.5	262.5	12.5	312.5
14	31	1	11.5	356.5	11.5	356.5
15	30	1	12.5	375.0	10.5	315.0
16	34	1	13.5	459.0	9.5	323.0
17	38	0	14.0	532.0	9.0	342.0
18	36	1	14.5	522.0	8.5	306.0
19	20	1	15.5	310.0	7.5	150.0
20	12	1	16.5	198.0	6.5	78.0
21	26	1	17.5	455.0	5.5	143.0
22	24	0	18.0	432.0	5.0	120.0
23	20	1	18.5	370.0	4.5	90.0
24	34	0	19.0	646.0	4.0	136.0
25	44	1	19.5	858.0	3.5	154.0
26	52	1	20.5	1,066.0	2.5	130.0
27	42	1	21.5	903.0	1.5	63.0
28	36	1	22.5	810.0	0.5	18.0
Total	—	23	325.5	10,081.0	318.5	8,296.0
(1) Days			14.15		13.85	
(2) Meter Days			2,205,262.5		2,157,837.5	
(3) Meter Day Degrees				68,298,775.0		56,205,400.0

Note (1): Total Cum. Eff. Unit Days ÷ 23
(2): Total Cum. Eff. Unit Days × 6,775
(3): Total Cum. Unit Day Degrees × 6,775

A little reflection will show that the above calculation gives the same results as though the combined total length (in days) of all the A lines in January were divided by the number of such lines to give the average length in days, and the same operation performed for the B lines, and a total of the two obtained.

(9) SAME PRINCIPLES APPLY TO OTHER METER-READING SCHEDULES

The above discussion, and Chart 4, were based on a meter-reading schedule in which Sundays and legal holidays were the only non-working days—meters being read on all remaining days. The same principles would apply to a different schedule—one, for example, where Saturday is also a non-working day. As a matter of fact, beginning November 11, 1933, the Equitable Gas Company changed over to this latter schedule. Had this system also prevailed in 1929, the diagram of Chart 4 would have been revised by the omission of horizontal lines for Saturdays as well as for Sundays; and the number of units in each month and the accumulation of weights would have changed accordingly.

Actual Statistical Procedure Recommended for Routine Calculations

The routine used by the Equitable Gas Company in the calculation of the weighted average temperature and billing period, is illustrated by Tables 3 and 4, headed "January, 1929" and "February, 1929," respectively. The essential difference between this routine and the procedure used in the above analysis, is that the sequence of calculations is based on the calendar month, even though half of these calculations pertain to sales reported in the current month and half pertain to sales to be reported in the succeeding month. For example, Table 3 "January, 1929" lists all of the daily temperatures in the calendar month, and then shows on the same sheet not only the assorted weights and products pertaining to sales reported in January, but also all the associated weights and products pertaining to sales to be reported in February. In other words, all calculations that depend directly upon the temperatures, meters, and working days for the calendar month of January are performed as soon as the U. S. Weather Bureau's monthly temperature summary is received and the accounting department has released the data on number of meters (as of the end of the month).

A month later, a similar sheet is prepared for the calendar month of February, with all the calculations corresponding to B and A′ on Chart 4. Then, in order to calculate the "weighted average billing period" and the "weighted average temperature" corresponding to the *reported* sales for February, it is only necessary to pick from the January calculation sheet the A weights and products (marked "Succeeding Month"), and from the February calculation sheet the B weights and products (marked "Current Month"), and combine them by the simple formulae described above in the theoretical analysis.

The latter calculations, corresponding to the reported February sales, are as follows:

Weighted Average Billing Period

(A) Jan. portion =	15.00 Days
(B) Feb. portion =	13.85 Days
Total	28.85 Days

Weighted Average Temperature

SUMMATION OF METER-DAY-DEGREES

(A) Jan. portion =	64,825,110.0 M.D.D.
(B) Feb. portion =	56,205,400.0 M.D.D.
Total	121,030,510.0 M.D.D.

SUMMATION OF METER-DAYS

(A) Jan. portion =	2,337,660.0 M.D.
(B) Feb. portion =	2,157,837.5 M.D.
Total	4,495,497.5 M.D.

$$\text{Weighted Avge. Temp.} = \frac{121,030,510.0}{4,495,497.5} = 26.92^\circ \text{ F.}$$

Following are similar calculations, corresponding to the reported March sales:

Weighted Average Billing Period

(A′) Feb. portion =	14.15 Days
(B′) Mar. portion =	15.31 Days
Total	29.46 Days

Weighted Average Temperature

SUMMATION OF METER-DAY DEGREES

(A′) Feb. portion =	68,298,775.0 M.D.D.
(B′) Mar. portion =	101,018,008.0 M.D.D.
Total	169,316,783.0 M.D.D.

SUMMATION OF METER-DAYS

(A′) Feb. portion =	2,205,262.5 M.D.
Mar. portion =	2,385,214.0 M.D.
Total	4,590,476.5 M.D.

$$\text{Weighted Avge. Temp.} = \frac{169,316,783.0}{4,590,476.5} = 36.88^\circ \text{ F.}$$

TABLE 5

TOTALS OF CUMULATIVE EFFECTIVE UNIT DAYS FOR MONTHS WITHOUT HOLIDAYS
METERS READ DAILY EXCEPT SATURDAYS OR SUNDAYS

Date of First Saturday	*31-Day Month*		*30-Day Month*		*29-Day Month*		*28-Day Month*	
	Current Month	*Succeeding Month*	*Current Month*	*Succeeding Month*	*Current Month*	*Succeeding Month*	*Current Month*	*Succeeding Month*
1	330.5	320.5	300.0	300.0	300.0	280.0	300.0	260.0
2	320.5	330.5	320.5	309.5	320.5	288.5	292.0	268.0
3	342.0	340.0	342.0	318.0	312.5	296.5	284.0	276.0
4	364.5	348.5	334.0	326.0	304.5	304.5	276.0	284.0
5	356.5	356.5	326.0	334.0	296.5	312.5	268.0	292.0
6	348.5	364.5	318.0	342.0	288.5	320.5	260.0	300.0
7	340.0	342.0	309.5	320.5	280.0	300.0	280.0	280.0

TABLE 6

TOTALS OF CUMULATIVE EFFECTIVE UNIT DAYS FOR MONTHS WITHOUT HOLIDAYS
METERS READ DAILY EXCEPT SUNDAYS

Date of First Sunday	*31-Day Month*		*30-Day Month*		*29-Day Month*		*28-Day Month*	
	Current Month	*Succeeding Month*	*Current Month*	*Succeeding Month*	*Current Month*	*Succeeding Month*	*Current Month*	*Succeeding Month*
1	408.0	398.0	377.5	372.5	348.0	348.0	348.0	324.0
2	403.0	403.0	372.5	377.5	372.5	352.5	344.0	328.0
3	398.0	408.0	398.0	382.0	368.5	356.5	340.0	332.0
4	424.5	412.5	394.0	386.0	364.5	360.5	336.0	336.0
5	420.5	416.5	390.0	390.0	360.5	364.5	332.0	340.0
6	416.5	420.5	386.0	394.0	356.5	368.5	328.0	344.0
7	412.5	424.5	382.0	398.0	352.5	372.5	324.0	348.0

It will be noted, as a check, that in Table 3 the total of 390.0 unit-days (succeeding month) and 416.0 unit-days (current month) is 806.0 unit-days and that the latter is the product of 31 days and 26 units. Correspondingly, 15.00 days (succeeding month) and 16.00 days (current month) add up to the number of days in the month, namely, 31. A similar check of Table 4 shows that

$$325.5 + 318.5 = 644.0 = 28 \times 23$$

and that

$$14.15 + 13.85 = 28.00$$

Calculation of Normal Weighted Average Temperatures

In the first part of this article, there was described a method of adjusting reported monthly sales from actual temperature to normal temperature. The normal temperature, to be comparable to the actual, must also be a "weighted average" for a composite month. For a particular gas territory, covering a limited climatic zone, these normal weighted average temperatures, for the twelve report months, are calculated only once, and are used as a reference base thereafter. These calculations are performed in precisely the same manner as the method just described, using calculation sheets similar to Tables 3 and 4. However, since the chances of Sundays falling on specific dates is evenly distributed in an endless series of years, all days in the hypothetical normal month are considered as working days, and the calculations made accordingly. The daily mean temperatures to be used are those used by the U. S. Weather Bureau as normal for the particular territory. Two sets of calculations will be required for February and March—one set to be used as normal for leap year, and the other for ordinary years. Both calculations will use the same February data up to and including the 28th.

If it is desired, calculations may be also made of normal weighted average billing periods based upon these same calculation sheets. No mention has hitherto been made of the use of normal billing periods, since in the first part of this article all sales were adjusted to a uniform basis of 30 days. But it is just as feasible to adjust each month's reported sales to the normal billing period for that month. The above described normal calculation sheets will show at once that the normal weighted average billing period for any report month is equal to the arithmetic mean of the number of days in the current and preceding months. Thus, the normal weighted average billing period for the report month of February (ordinary) is 29.5 days, and that for February (leap year) is 30.0 days.

Tables for Rapid Calculation of Weighted Average Billing Periods

As pointed out in the first part of this article, forecasts of residential sales are predicated upon normal temperatures, but actual weighted average billing periods may be used if the general nature of the meter-reading schedule is known. The calculation of these billing periods may be made very rapidly by reference to base tables, such as Tables 5 and 6. These have been prepared for the two respective types of meter-reading schedules described in this article. Table 5 applies where meters are read on all days except Saturdays, Sundays, and legal holidays; while Table 6 applies where meters are also read on Saturdays. Each table gives directly for any calendar month *having no legal holidays* the "cumulative effective unit-days" representing, first, the gas consumption falling into the current month's sales report and, second, the gas consumption falling into the succeeding month's sales report. These tables eliminate most of the work of calculating the weighted average billing periods, since it becomes unnecessary to go through the details of building up these unit-days' summations.

However, when a month contains a legal holiday (New Year's Day, Washington's Birthday, etc.) it is necessary to adjust the cumulative effective unit days in the table by the following rules. These rules are the same for both types of schedules.

RULES FOR MONTHS HAVING LEGAL HOLIDAYS

(A) *Cumulative Effective Unit Days—Current Month*

(1) Subtract ½ day from the date of the holiday.

(2) Subtract the result from the cumulative effective unit days given in the table.

(B) *Cumulative Effective Unit Days—Succeeding Month*

(1) Subtract the date of the holiday from the number of days in the month.

(2) Add ½ day.

(3) Subtract the result from the cumulative effective unit days given in the table.

Personnel Service

SERVICES OFFERED

Gas Engineer (37). Early technical training chemical engineering, nine years' chemical research gas analyses, fuels and gasoline adsorption. Eight years' active in gas engineering in charge of plant construction, inventory and appraisal valuations. **978.**

Engineer with utility accounting experience. B. S., M. E. E.; postgraduate work. Three years' research assistant, National Industrial Conference Board. Twelve years' gas and electric utility experience, rates, franchises, cost allocations, contracts, research in utility management problems. Experience with P. S. C. accounting. (N. Y.). **979.**

Controls and **gas burner engineer** wants position offering greater possibilities. Has several years' practical work in design, application and operation thermostatic and gas mixing controls or mechanical and electrical types, and gas burners all types. Fundamental training and experience, combustion, metallurgy, mechanics and electricity. **980.**

Sales Engineer having specialized in the sales and promotion of automatic gas water heaters for over 10 years. Planned and conducted many successful sales campaigns. Well acquainted with gas companies, plumbing supply houses and have arranged many eastern plumber dealer setups. **981.**

Specialist in problems pertaining to efficiency, operation and maintenance; well grounded in the fundamentals of fuel production, transmission and distribution. Have proven record for load building, new business and fuel application. Experience also covers appraisal, rates, selling and public relations; graduate engineer. **982.**

Accounting, Cost and **General.** Eight years' experience; gas plant, transmission and distribution system construction and operations analyzed. Ascertainment of cost, accounting of same determined in conformity with utility and public service commissions requirements. Field records gas works and main systems audited and accounting and statistical reports compiled. **983.**

Assistant Superintendent of coal gas plant desires position with a coke oven or coal gas plant in supervisory capacity. Three and one-half years university training in civil engineering; eight and one-half years' experience in coal gas plant. Familiar with plant construction work. (29) Married. **984.**

Presently employed. Available thirty days. Do you need a gas man who can get results? I am willing to prove it by a year's trial. Experienced thirteen years in gas business **sales promotion,** making friends, boosting sales, creating company good will; can help sales force get new business. **985.**

Manager. 20 years' experience managing water gas properties. 5 years' experience managing natural gas property. Experience includes all phases including distribution, new business and public relations. **986.**

Manager or **Superintendent.** Twenty years' practical experience handling properties having up to 4,000 meters. Water or coal gas plants. Have had good success in rebuilding run down properties. Would take living wage and share of profits, married (50). **987.**

Engineer experienced in following: Operation —coal and water gas plants—distribution and service department. Design—several water gas plants with equipment—coal gas condensing and purification equipment—high and low distribution systems. Construction —complete water and coal gas plants—remodeling plants; distribution. **988.**

Research Chemist—Several years' experience in a coke plant together with research and development work for a leading research corporation. Familiar with analyses of by-products and routine analytical methods. Now employed but desire a change. **990.**

Utilization and **Sales Engineer** long experience New York Metropolitan and adjacent area in house heating, water heating, restaurant and industrial work. Testing installation and servicing. **991.**

Gas Engineer desires new connection. Graduate chemical engineer. Fifteen years' experience in design, construction, operation and maintenance of Water Gas Plants and high-, medium- and low-pressure distribution systems. Able assistant or manager. **992.**

SERVICES OFFERED

Gas range and Appliance **salesman** seeking substantial connection. Thoroughly experienced and capable of handling any territory. Have the ability to supervise and perform sales promotion duties. Will locate anywhere, no preference as to territory. Interested in salary and expenses or drawing account, commission and expenses. **993.**

Gas Engineer. Ten years operating all types of plants, various capacities from cadet to superintendent. Six years, gas manufacturing equipment company, last three chief engineer. Three years with public servic commission, valuation engineer. Experience ideal for holding or operating company engineer. **994.**

Sales Manager—Sales Promotion Manager—Salesman—competent, aggressive, experienced,—for gas company or manufacturer wanting successful sales. Appliances, gas merchandise, gas distribution supplies, plumbing, heating specialities. 12 years' effective selling, promoting, advertising, managing volume sales for leading specialty manufacturers. National gas company executive, jobber and consumer contacts. **995.**

Office Manager (31) 3 years in company of 46,000 meters, 14 years' experience in clerical and accounting work, will accept position in any capacity—collector, accountant, storekeeper, payroll work, etc. Married. **996.**

Industrial Sales Engineer:—Several years' experience in supervising the sales, installations and maintenance of house heating, industrial steam and water heating. Special training and knowledge derived from long experience with eastern utility companies will be a great asset to any corporation. **997.**

Gas minded, practice trained water gas plant man (39). Experience ranged from sole operator 4-foot plant to assistant **superintendent** of a 3½ million daily plant. Also experienced as general foreman of distribution construction, mains and services. **999.**

Energetic efficiency gas man with twenty years' experience, operating and managing, desires change from present position, to that of **manager** or **superintendent** of medium sized utility or assistant to manager of large one. Knowledge of sales problems. Single, college, go anywhere. (39). **1000.**

Gas Technologist—Young man (34) with broad experience in gas industry as manufacturing and distribution engineer, operator and designer of equipment, desires responsible position where valuable engineering and business experience can be put to use. **1001.**

Sales Engineer, thoroughly experienced in new business operations of gas utility, domestic appliances, house heating and industrial application, wants position where there is chance for advancement. **1002.**

Engineer (27) B. S. Chemical Engineering 1932; 1-year graduate study. Experience: 18 months automotive industry; 3 months gas pipeline; 22 months gas appliance industry where now employed. **1003.**

Sales **Supervisor** or Sales **Engineer.** Have had considerable experience in industrial, commercial, house heating and domestic sales work. Also am familiar with design and installation of equipment. Have worked with manufactured and natural gases. **1004.**

Kitchen **Equipment Salesman.** Desires connection with well-established hotel and restaurant kitchen equipment house. Twenty-five years' experience designing and selling kitchen equipment in and around New York City, through architects and builders. Thoroughly familiar with all gas appliances for heavy duty work in kitchens. **1005.**

Thoroughly seasoned and competent **sales manager** able to handle any or all divisions of commercial and public relations departments. Several outstanding records in water heating, commercial and industrial work. Can get volume business in any territory and produce satisfying results. **1006.**

Auditor: Age 30, University graduate in 1927, accounting major. Three years' public accounting on public utility staff, three years with large holding corporation, supervising property accounting for thirty-two gas properties. Assistant general auditor. **1007.**

SERVICES OFFERED

Engineer Superintendent—Advanced engineering degree. General experience:—ten years' operation, production and distribution, superintendent of coal and water gas plants; ten years' gas engineer on design, construction and expert operation of production plants; three years in appraisals, reports and property records; also research. **1008.**

Graduate **Mechanical Engineer** desires position in any department, thorough, capable. If you want a live wire who can get results either in distribution, manufacture or sales, glad to arrange personal interview at any time. Natural gas experience. **1009.**

Practical and technical **gas engineer**—thirteen years' experience design, layout, development, estimating, advertising, selling and appraisal of gas plants and equipment. Also competent structural design. **1010.**

Graduate Engineer with twelve years' experience in the gas business; assistant superintendent of large water gas plant, estimating costs for construction and alteration of coke and gas plants, physical inventories and appraisals, desires position in operating or construction department, married, (35). **1011.**

Sharp reductions in stock transfer costs; experienced **stock transfer** expert can show corporation executives how to effect drastic reductions in costs. **1012.**

Practical, technically trained man seeks opportunity in industrial **gas burner** and **appliance** field with manufacturer or utility. Experience includes making, testing, developing industrial burners and appliances; traveled several years supervising installations. Likes to travel. will go anywhere. Last five years industrial salesman for large eastern utility company. **1013.**

Semi-Senior **Accountant** for three years—public utility staff—accounting firm, then three years as special accountant with large electric and gas corporation until they went into receivership. Auditor of disbursements for large corporation board, thorough experience in all departments of private corporation work. University graduate. (30). **1014.**

Engineer—Broad experience. Three years in valuation:—appraisals, reports, and property records. Three years in heating and ventilating:—research, design and installation. Supervision of coal and water gas production and distribution. Design, construction, estimates, expert operation and research. Graduate; advanced engineering degree. **1015.**

Utility Executive available: have had 25 years' experience in all branches of utility business, organization, financing, construction, operation and utilization. Recently vice-president in charge of sales of large holding company, selling gas, electricity, water. ice, fuel, merchandise and securities through local operating companies. **1016.**

Experienced **Sales Engineer** (ME) having broad background of gas and other industries; have designed, purchased. operated and sold plant equipment. Essentially practical yet have vision, iniative and creative ability; specialist in gas measurement on which much original work accomplished. **1017.**

Insurance Specialist: graduate engineer, experienced utilities, operating and holding company, meter reader to junior executive; now employed, specialized last five years in producing large economies in insurance protection of all kinds for utility companies. Available special reports or full time. **1019.**

POSITIONS OPEN

One of the old line water heater manufacturers requires salesman to call on utilities and jobbers. Must have previous experience. Good territories open. **0297.**

Large Manufacturer popular priced gas ranges has opening for **salesman** in two territories midwest and east. State previous selling experience. **0298.**

Manufacturer of well-known line of gas water heaters requires **distributor** who can devote whole time to their rapidly growing business in the New York retail trading area. Experience with sale of gas appliances necessary. Must be acquainted with sales executives of gas companies in that area. Drawing account against commissions. **0299.**

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PRINTED IN THE U. S. A.